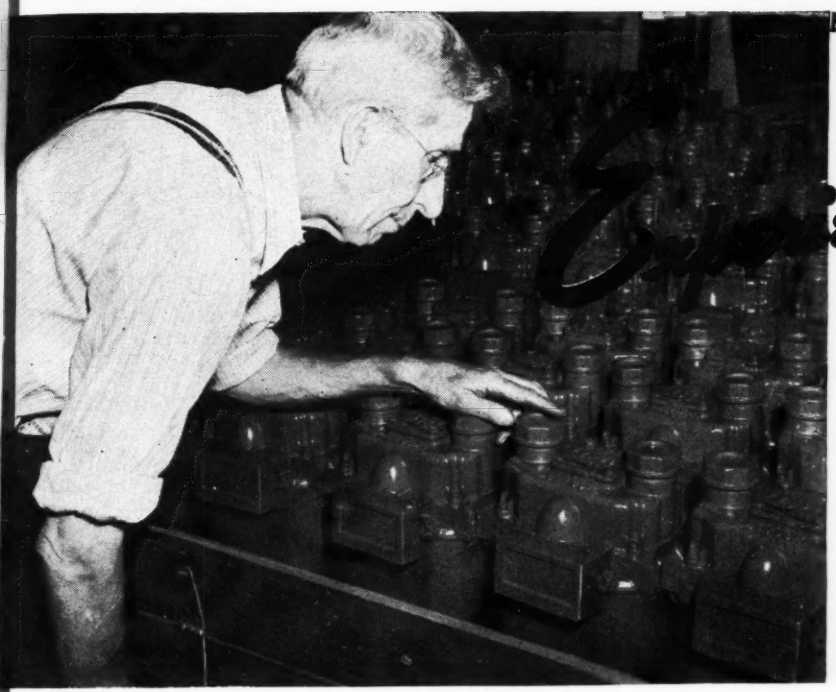
GAS

ENGINEERING • UTILIZATION • LOAD-BUILDING • MANAGEMENT

EAST ENGINEERING LIBRARY

JUL 1 8 1945



Experience makes them RIGHT!

Long experience in the field of gas measurement and control is typified by the key men in the EMCO organization. There are a number of employees with a half century of experience, one such veteran being pictured at the left.

CONTINUOUS RESEARCH ASSURES DESIGN PERFECTION

In the EMCO organization, planning is a continuous process. EMCO research and development engineers are always thinking ahead of the times. EMCO sponsored fellowships at the Mellon Institute of Industrial Research and at the Armour Research Foundation follow through on significant developments that will either enhance performance or add to the value customers receive from completed products.

Such technical advances, combined with the careful craftsmenship of an experienced group of employees, evolves in EMCO Meters and Regulators, products that in terms of service fully keep their engineering promise.

EMCO

PITTSBURGH EQUITABLE METER COMPANY

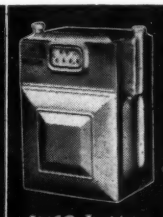
Atlanta, Chicago, Houston, Pittsburgh, Kansas City

MERCO NORDSTROM VALVE CO.
Main Offices, PITTSBURGH, PA.
San Francisco

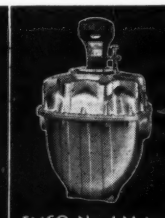
Los Angeles, Tulsa, Boston, Seattle, New York

National Meter Division, Brooklyn, N. Y.

O Standard
estic Meter



EMCO Tin Meter
for Domestic Service

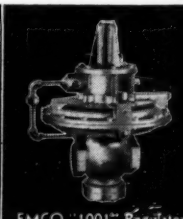


EMCO No. 4 Meter
with EMCORECTOR

EMCO Large Capacity
Pressed Steel Meter

EMCO Balanced Valve
Pilot Loaded Regulator

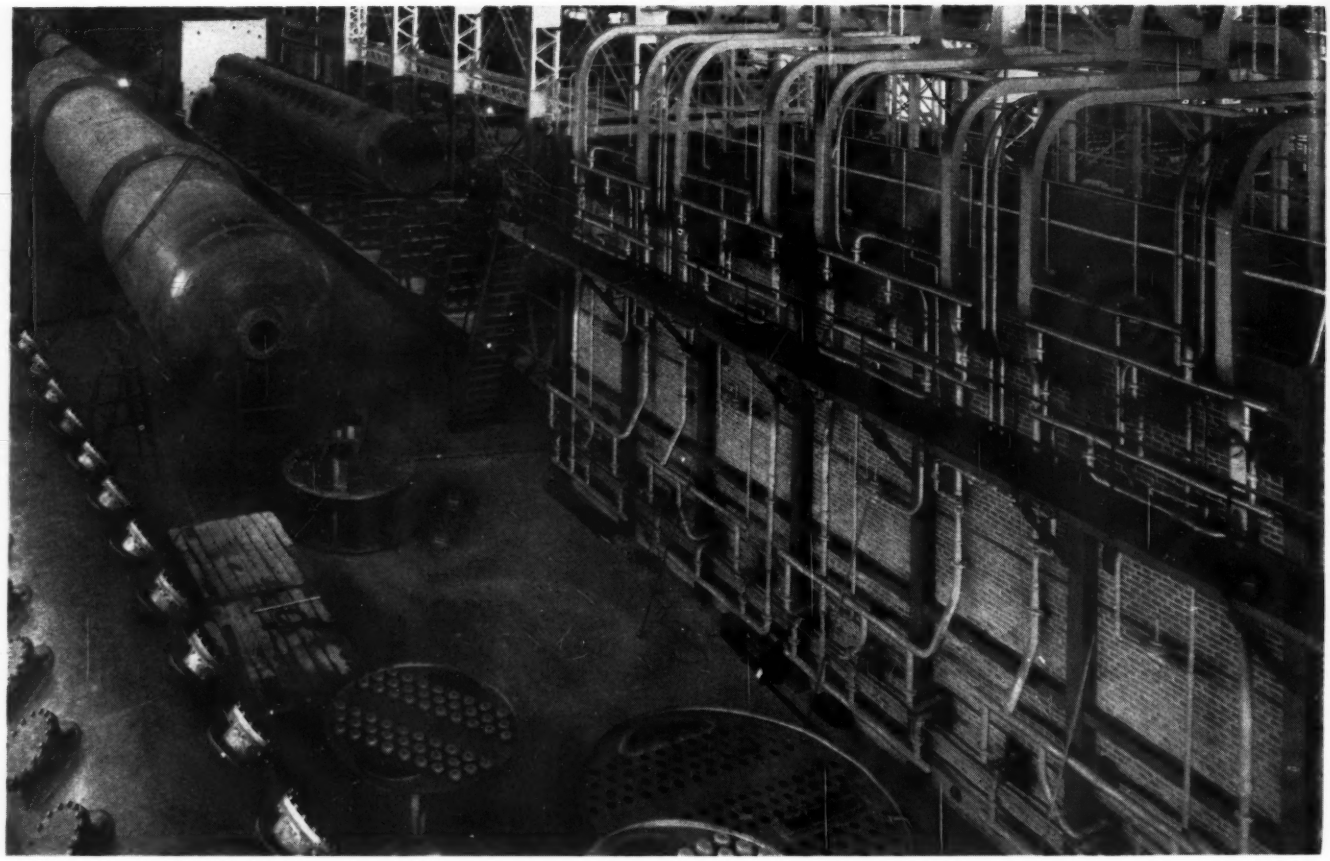
EMCO Balanced Valve
Regulator with EMCOLOADER



EMCO "1001" Regulator
Standard Type

EMCO Type "B"
Ejector Regulator

RELIANCE REGULATORS... YOUR ASSURANCE OF DEPENDABLE PERFORMANCE



METALLURGISTS, in their search for better steels, are continually experimenting with different composition and alloys of exacting formulae. In fabricating these steels into tanks, armament, boilers, or fractionating towers, precise heat control is maintained during heat-treating. It is these controls which permit the minute variances of furnace temperatures specified for normalizing or tempering. These controls are your assurance that the metallurgist's specifications of the right properties will be retained.

For over 34 years Reliance engineers have worked with industry to perfect the flawless, trouble-free performance built in every Reliance Regulator. Performance you can depend on regardless of requirements. Reliance Regulators are made in types and sizes most needed by the gas industry—production, distribution, industrial, domestic—for natural, manufactured and liquid petroleum gases.

Reliance bulletins give complete information. Write TODAY for copy.

AMERICAN METERS RELIANCE

AMERICAN METER CO EST 1836

RELIANCE REGULATORS

ANNOUNCING...

U.S. *STANDARDIZED MECHANICAL JOINT* CAST IRON PIPE

We are now prepared to furnish U. S. *Standardized* Mechanical Joint Pipe and Fittings in sizes from 3″ to 12″ with parts that are *interchangeable* with those furnished by other manufacturers of cast iron mechanical joint pipe. Standardization will eventually be extended to sizes above 12″. In the meantime, these larger sizes will be furnished with our regular U. S. Mechanical Joint as heretofore.

U. S. PIPE & FOUNDRY CO.

General Offices: Burlington, N. J.

Foundries and Sales Offices throughout the U. S.

Advertisers

American Brass Co. —
American Cast Iron Pipe Co. —
American Meter Co. 4, 5
American Radiator & Standard Sanitary Corp. —
American Recording Chart Co. 68
American Stove Co. —
Association of Gas Appliance and Equipment Manufacturers —
Barrett Division —
W. A. Bechtel Company 14
Blaw-Knox 13
Bryant Heater Co. —
Carbide & Carbon Chemical Corp. —
Cast Iron Pipe Research Association 6, 7
Clark Bros. Co., Inc. —
The Cleveland Trencher Co. 66
Connelly Iron Sponge & Governer Co. 74
The Cooper-Bessemer Corp. 3
Crane Co. 17
Cribben & Sexton Co. 8
Day & Night Manufacturing Co. 71
Dearborn Chemical Co. —
Domestic Thermostat Co. 59
Dresser Industries, Inc. 18, 71, Fourth Cover
Fisher Governor Co. 51
Florence Stove Co. —
The Fluor Corp., Ltd. —
General Controls Third Cover
General Gas Light Co. —
James Graham Manufacturing Co. 69
E. F. Griffith Co. 72
Hammel Radiator Eng. Co. —
H-M Regulator Co. 73
H-M Thermo Control Co. 73
Harper-Wyman Co. 41, 42
Johns-Manville 62
Kitson Co. 70
Merco Nordstrom Valve Co. Front Cover
Lee B. Mettler Co. 74
Milwaukee Gas Specialty Co. —
Minneapolis-Honeywell Regulator Co. 16
Mueller Co. 74
National Tube Co. —
Natural Gas Odorizing Co. —
Norton-McMurray Mfg. Co. 73
Pacific Coast Gas Association 64
Pacific Gas & Electric Co. 67
Payne Furnace Co. Fourth Cover
Peerless Mfg. Co. —
Phillips Petroleum Co. 34
Pittsburgh Equitable Meter Co. Front Page
Reliance Regulator Corp. Second Cover
Remington Rand, Inc. —
Reynolds Gas Regulator Co. 63
Rheem Manufacturing Co. 65
Robertshaw Thermostat Co. —
Roots-Connersville Blower Corp. —
Geo. D. Roper Corp. —
Ruud Manufacturing Co. —
Semet-Solvay Engineering Corp. 72
Servel, Inc. 38, 39
Sharples Chemicals, Inc. 12
M. B. Skinner Co. 11
A. O. Smith Corp. 57
Spencer Thermostat Co. 74
Sprague Meter Co. 61
Stacey Brothers Gas Construction Co. —
Titan Valve & Mfg. Co. 53
Union Carbide & Carbon Corp. —
U. S. Pipe & Foundry Co. 1
United States Steel —
Utility Appliance Corp. 52
Vapor Recovery Systems Co. 72
Vulcan Proofing Co. 48
Walworth Co. 47
Ward Heater Co. 54
Warren Petroleum Corp. 58
Webster Engineering Co. 45
Welsbach Engineering & Management Corp. —
Whitehead Metals Products Co. —

GAS

REG. U. S. PATENT OFFICE

Twenty-First Year of Publication

Contents for July, 1945

EDITORIAL COMMENT

Thermally Thinking ..... *By Elliott Taylor* 9
Highlights 15
Sales Slants 43
Postwar Notes and Notions ..... *By Stanley Jenks* 49

FEATURE ARTICLES

Natural Gas Reserves ..... *By Dr. E. DeGolyer* 19
Production and Conservation of Gas ..... *By C. I. Wheat* 21
Training Program for Gas Appliance Servicemen
No. 1. A Suggested Plan for the Smaller Gas Co. ..... *By C. C. Westmoreland* 22
IOCC Outlines Policies at June Meeting ..... *By O. D. Hall* 25
Technical Phases of Overland Pipe Pressure Welding ..... *By E. P. Jones* 26
The Synthol Process ..... *By Paul Ryan* 30
Recovery of Free Sulphur from Natural Gas ..... *By C. W. Cooper in collaboration with Howard Waddle* 31
Unaccounted For Gas ..... *By C. H. Webber* 35
Corrosion and Protection of Buried Metallic Structures ..... *Edited by Guy Corfield*
Cathodic Protection on High Pressure Mains ..... *By K. B. Anderson* 37
Case Study House Program in California 44
Vertical Gas Furnace for Heat Treating 50

DEPARTMENTS

New Books and Pamphlets 36
New Products 55
Operating Ideas 56
People 60
Associations 64
Pipeline News 68
Current Reading 70
New Production 72

Publication Office: **LOS ANGELES 14, California, 1709 West Eighth Street, DRexel 4837.**

Branches: **NEW YORK 17, 50 E. 42nd Street, MUrray Hill 2-4504; WASHINGTON, D. C., 306 National Trust & Savings Building, District 0215; CHICAGO 3, Illinois, 1064 Peoples Gas Building, HARrison 6634.**

JAY JENKINS ..... President
JAMES E. JENKINS ..... Secretary-Treasurer
ROY D. CRIPPEN ..... General Manager
L. V. HOHL ..... Eastern Manager
DAVID CARMEN ..... Mid-West Manager
ARTHUR ROHMAN ..... Editor
ELLIOTT TAYLOR ..... Washington Editor
GUY CORFIELD ..... Technical Editor
O. D. HALL ..... Mid-Continent Editor
PAUL LADY ..... Assistant Editor

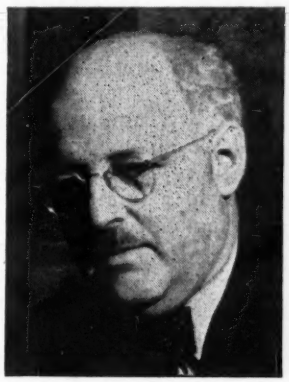
July, 1945. Volume XXI. Number 7. GAS is published monthly by Western Business Papers, Inc., 1709 West Eighth Street, Suite 320, Los Angeles 14, California. Subscription price: United States, Mexico, Cuba, South and Central American countries (in advance), 25 cents the copy; two years for $3.00, $2.00 per year. Canada and all other countries, $3.00 per year. Entered as second-class matter August 20, 1936, at the post office at Los Angeles 14, Calif., under the Act of March 3, 1879. Member: Audit Bureau of Circulation; Associated Business Papers, Inc. Publishers: BUTANE-Propane News; Handbook BUTANE-PROPANE GASES; THE BOTTLED GAS MANUAL; WESTERN METALS.

THERMALLY THINKING

By ELLIOTT TAYLOR, Washington Editor

Expansion Is Essential

WE BELIEVE special attention should be directed to the article on U. S. Natural Gas Reserves (P. 19) by E. DeGolyer. This information which has already been presented as testimony before the O'Mahoney Committee should go far toward settling the controversy regarding postwar expansion of natural gas territory, and the desirability of introducing the fuel into new markets where it has heretofore been known only as a desirable hope for some far distant future.



Elliott Taylor

Study of the DeGolyer figures points up one fact—that expansion into new markets is an absolute necessity in the conservation of natural gas, rather than any threat to its effective promulgation.

Speaking earlier in the month of June before the Interstate Oil Compact Commission in Oklahoma City, Okla., Dr. DeGolyer pointed out that the proven gas reserves of 140 trillion cu. ft. are equivalent to 35 times the unprecendented 1944 withdrawals of 4 trillion cu. ft. including gas flared and wasted. This ratio is almost twice as favorable as the corresponding ratio of oil withdrawals, as is pointed out in the article.

With oil reserves in lower relative supply than those of natural gas, it requires no fantastic flight of prophecy to predict that the intensified search for oil will result in new gas discoveries, both dry gas and gas in association with oil. Explorations over wider areas and to greater depths will add to both the oil and gas reserves, just as they have in the past.

This increased gas production where it occurs in association with oil will have to be sold, returned to the ground or wasted. And from the economic standpoint, conditions that make it impossible to sell gas at a reasonable price also render it unprofitable to return it to the ground. The cost of handling the gas is simply more than the gas is worth on the market.

Commenting on the question of markets, Dr. DeGolyer told the representatives of the oil compacting states: "Adequate price is the greatest conserving agent in the world . . . there is no problem of end use or conservation which will not be solved, and better solved than can be done by the best of regulations if the producer can have adequate markets and at a decent price. First things first; let's don't worry about end use as long as we burn a billion feet a day in the flares."

Adequate price implies access to adequate markets, and adequate markets are found only in those areas where concentration of population and industry are sufficient to guarantee and sustain them. We believe that this fact is nowhere better recognized than by the officials of the gas and oil producing states who, despite their occasional clamor for unconstitutional legislation to keep the gas at home, are in reality concerned only with keeping it at home until it can command a decent price, and the shorter that time the better.

Until the matter of natural gas market expansion policy is settled, the industry can in no wise be sure of its future. But seasoned and sound observations such as those of this eminent geologist should go far toward crystallizing a policy that can reasonably be expected to endure.

Crocodile Tears

IN rather belated recognition of the infernal nuisance it has made out of the matter of certificate hearings on applications to do minor construction jobs under the Natural Gas Act, the Federal Power Commission has broadcast another of its "What had we better do now?" queries to all persons interested in such proceedings.

"It has been suggested" says the Commission, "that time, travel and expense are unnecessarily expended in holding public hearings on applications for certificates of convenience and necessity, under Sec. 7(c) of the Natural Gas Act, as amended, which involves relative minor construction or acquisition of facilities, *and on which no one desires to be heard.*" The italics under the joker clause are our own contribution. And if no one desires to be heard, "the application could be disposed of by the Commission without holding a formal public hearing."

Seldom, if ever, are we tempted to question the good faith and honest if at times bemused desire of the Commission to be a force for the best, in this best of all possible worlds. But if the Commission wanted to make a grandstand play, if it wanted to make an empty ges-

ture toward efficiency in its own operations and economy in its demands on the applicant's time, it might well have made just the proposals that are contained in this newest letter of inquiry.

For if certificates without public hearings are to be granted only in those cases where no one desires to be heard, it can be anticipated in advance that the number and the scope of these certificates so granted will be practically nil. Unwittingly perhaps, the Commission has turned its whole certificate hearing procedure into a standing invitation for the natural gas obstructionists to stage a field day of irrelevant exposition on every application considered.

The concept of public convenience and necessity that the Natural Gas Act is set up to safeguard and enhance has been tortured into new and strange implications by the coal and railroad intervenors. Where once it was concerned with bringing in gas to potential users in any area where it could be shown to be physically and economically practical to do so, it is now overburdened with consideration of the competitive rights of the purveyors of inferior fuels to continue in the exploitation of their present markets merely because they have long enjoyed them. Under this novel appreciation of the rights of the consumer, the mere fact that he might prefer one fuel to another is not a matter of legitimate consideration. And if the Federal Power Commission broods at all over abstract matters, it probably ponders the question of whether it is good for a man to live the sedentary life that a fully automatic fuel may make possible.

With this sympathetic attitude toward their contentions already established in the Commission viewpoint, it is highly improbable that the natural gas obstructionists would permit any application for construction of gas facilities to slip through without invoking the nuisance value that public hearings entail to the gas industry.

But the Federal Power Commission has asked for suggestions, and we would consider ourselves remiss in the discharge of our duty as an enfranchised citizen of the Republic if we did not respond to the best of our limited ability. So we suggest to the Federal Power Commission that it just throw away the proposed new form and all of the replies that it gets to its letter of June 20th, and that it proceed about the business of simplifying certificate procedure in the way that was envisioned by Congress when it wrote Section 7(f) into the 1942 amendments to the Natural Gas Act. The Commission has so consistently ignored this inviting avenue to simplification of its onerous labors, that we believe its own convenience and necessity may well be served if we quote the subsection in its entirety:

> "(f) The Commission, after a hearing had upon its own motion or upon application, may determine the service area to which each authorization under this section is to be limited. Within such service area as determined by the Commission a natural-gas company may enlarge or extend its facilities for the purpose of supplying increased market demands in such service area without further authorization."

In over three years that have elapsed since this amendment was written into the law, the Commission has not acted on one single application for the determination of service area, nor has it originated upon its own motion a single hearing for such a determination. Yet pending before it in some cases for years, have been applications from major pipe line companies whose total transmission lines aggregate over 14,000 miles, rendering service in 18 states.

Is it any wonder that we are skeptical of the Commission's sudden interest in cutting down the time and traveling expense involved in public hearings, when it could by one single determination in each area eliminate the necessity for all future applications in that area?

The Commission has consistently pleaded that it does not have available the personnel necessary to act on these special applications. Yet in the face of that plea,—in spite of the fact that it hasn't been able to hire the hands to carry out the work as outlined for it by Congress, it still is willing to recruit the extra help needed to launch a natural gas investigation (Docket G 580) which Congress has never authorized.

Fortunately it now appears that when the O'Mahoney Committee hearings are concluded, the Commission will be able to learn all it needs to know about the natural gas industry just from reading the transcript of the testimony.

With the time and talent thus released, we have no doubt that the commissioners will therefore turn their attention to polishing off the chores already assigned to them before looking about for any new regulatory worlds to conquer.

Determination of service areas would make a wonderful place to start.

Fair Enough

WE are indebted to our friends at AGAEM for a copy of a letter sent out by "a large Eastern combination utility company" to its district managers. The name of the company we take it is something in the way of a military secret, but the letter seems in our opinion to represent a fair attitude on the part of any management that has both gas and electric loads to worry over.

It reads in part " . . . where a customer is located in either our combination or all electric territory and has available both gas and electric service, the company will recommend the gas range for cooking.

"There are many off-line conditions in our territory where the electric range will . . . be recommended . . .

"In discussing with manufacturers, distributors and dealers the all electric kitchen, we should endeavor to have them provide the gas range in their layout.

"If the customer desires . . . the electric range, the company will supply adequate capacity and cooperate to the end that his wishes are fulfilled."

We believe that this is in general fair enough. It is realistic and it should be as nearly an impartial policy as can be expected.

However. it must be recognized that by implication it takes the burden of promotion entirely off the utility shoulders and puts it on the manufacturers of both gas and electric appliances. It is notorious that electrical cooking equipment has always been priced high enough to leave an adequate margin for manufacturer promotion, a condition that has not always prevailed with the makers of gas ranges.

It is to be root hog or die in the combination utility territories as between the gas and electric range, let us at least hope that the utilities will support the hand of the gas range manufacturers who try to build quality features into their merchandise, and who add to their prices a reasonable mark-up for proper promotional activities.

NATURAL GAS RESERVES

Adequate Price and Market Can Best Protect the 200 Trillion Cu. Ft. Reservoir

By DR. E. DeGOLYER

DeGolyer and MacNaughton, Dallas, Texas

AS OF THE first of this year, (1945) the United States has a proved gas reserve in excess of 140 trillion cu. ft. This estimate, except for the fields of the Appalachian area, or PAW District No. 1, includes only those fields having individual reserves of 20 billion cu. ft. or more. Reserves have been calculated on a pressure base of 16.4 psi and at 60° F temperature.

For a broad consideration of our natural resources, it may be noted that with present fields calculated to a pressure base of atmosphere or 14.4 psi, making allowance for probable extensions of discovered fields which have not yet been proved and making allowance also for lesser fields not included in the present estimate, we are justified in considering our present gas reserves to be something of the order of magnitude of 200 trillion cu. ft.

The present estimate, except for the Appalachian area, was built up from estimates of the fundamental data on some 426 different fields. The estimate for the Appalachian area composed of a great number of small pools and being comparatively unimportant volume-wise, was made from decline curves. It is believed that this is the most comprehensive survey of this resource which has yet been undertaken.

A breakdown of the estimated reserve by PAW administrative districts together with a partial breakdown by states is shown in Table 1.

The ratio of estimated reserve to the current rate of consumption is important only as an index figure. If we broadly estimate—not the consumption but the withdrawals, including waste, at four trillion cu. ft. for 1944, we have a ratio of 35 to 1; a ratio greater than double the similar reserves-consumption ratio for oil. Table 2 gives the past estimate of reserves.

Discovery of Additional Reserves: No geologist has yet been able to determine why the successful drilling of one prospect may result in the discovery of an oil field while that of another results in the discovery of a gas field. Both types of deposit occur in precisely the same type of geological trap and the two types of mineral hydrocarbons are found in almost every degree of gradation from oil fields with a minimum amount of gas in solution—say 20-30 cu. ft. per bbl.—to straight gas fields.

Solely on this basis one might presume that future prospecting would be likely to result in the discovery of gas reserves in approximately the same ratio to the discovery of oil reserves as has been true in the past. This is not the whole picture. Many gas fields and many substantial gas shows have been plugged and abandoned, or neglected, in the past, either because of the extremely low price for the gas or because of there being no market whatsoever. Almost no effort to prospect for natural gas as such has been made except in California and the Appalachian area.

Furthermore, one of the greatest probable sources for the finding of additional oil reserves is by deeper drilling, both in known oil fields and in areas which have already been prospected unsuccessfully to shallow depths. It is common knowledge that within the last decade drilling to increasingly greater depths has resulted in the discovery of greater proportions of the mineral hydrocarbons in the gaseous phase as compared with those in the liquid phase—oil—, than was true for prospecting to shallow depths in preceding periods. In other words, the deeper prospecting of the past 10 years has resulted in the discovery of greater proportions of gas to oil than was previously the case.

It seems to be likely that this proportion will continue to increase with increasing depth and that this increased opportunity for discovery together with the backlog of reserves now existing, is likely to provide the nation with a satisfactory position as to supplies of natural gas for many years to come.

Uses: Up to the present time the consumption of gas has been almost altogether as a fuel and for the manufacture of carbon black. We now appear to be on the threshold of a substantial use of natural gas as a raw material for the manufacture of chemicals—formaldehyde, ketones, alcohols, etc.—and, more important volume-wise, as a raw material from which much of the motor fuel of the future may be made. It now appears that the time will not be far distant when 10 Mcf of natural gas may be regarded as a potential barrel of gasoline.

If my speculation that, broadly speaking, our discovered gas reserves

Dr. E. DeGolyer

DR. E. DeGOLYER is considered one of the world's outstanding authorities on the subject of oil and gas reserves. As an independent oil producer, geologist and petroleum engineer he has been actively identified with the oil industry for the past 35 years. Until recently he served as Assistant Deputy in the Petroleum Administration for War. He is chairman of the Engineering Committee of the Interstate Oil Compact, a director of the American Petroleum Institute and a past president of both the American Association of Petroleum Geologists and the American Institute of Mining and Metallurgical Engineers. He is also a member of the Governor's Committee on Oil and Gas Policy for the state of Texas.

The firm of DeGolyer and MacNaughton, of which Dr. DeGolyer is senior partner, has been occupied with the study of natural gas reserves for the past eight months. The work was undertaken on commission from E. Holley Poe and Associates, natural gas consultants. The complete findings on natural gas reserves will constitute a section in a forthcoming analytical study of the natural gas industry which is being prepared by the Poe organization. The material here presented is based on a condensed version of the study, in which form it was recently presented before the Senate Committee on Investigation of Petroleum in Relation to the National Welfare, better known as the O'Mahoney committee.

TABLE 1. BREAKDOWN OF ESTIMATED GAS RESERVES.

			trillion cu. ft.
No. 1	(Appalachian Area)		5.000
No. 2			17.062
	Kansas	10.940	
	Oklahoma	6.122	
No.3			103.583
	Arkansas	0.978	
	Louisiana	17.212	
	Mississippi	0.952	
	New Mexico	2.408	
	Texas	82.033	
No. 4			2.252
	Colorado	0.100	
	Montana	1.224	
	Utah	0.100	
	Wyoming	0.828	
No. 5			12.962
	California	12.962	
Total			140.859

may be regarded as being of the order of magnitude of 200 trillion cu. ft., is not too unreasonable, they may well be equal in importance, or of even greater importance, than our proved oil reserves although it is clearly realized that only a portion of the gas reserves are likely ever to be used for conversion to liquid hydrocarbons.

Conservation:

We must admit with regret that great quantities of gas have been wasted and that great quantities are currently being wasted. We can only claim in extenuation that much of this waste occurred before the function of gas in oil production was understood, that much of the current waste is occurring because of lack of markets and inadequate price and that much of this current waste is the result of excessive wartime demands for oil, coupled with shortages of materials, and of manpower. If the industry had been in that ideal state where not a single cubic foot of gas was being wasted on the day of Pearl Harbor—which it was not—, we would still be suffering substantial waste of solution gas at the present time because of this shortage of men and materials. The correction lies with increasing knowledge of the industry, with continued improvements in state regulation, and with increasing markets and better price.

I have used the term "great waste" somewhat loosely and without any desire to minimize bad practices which exist in the industry. Actually, the problem is a complex one. Much of what we have called waste is unavoidable and should be called loss. No gas is being wasted from dry gas fields. Much of the solution gas is in small fields where the volume is so little that it is not economically feasible either to collect the gas nor to put it back into the formation. I know that extensive plans have been made—plans which have had to be held in abeyance as a result of wartime shortages of men and materials—for putting much of the gas now being flared back into the formation. The industry is not unmindful of the desirability of constant improvement in its production practices and is anxious to conserve gas whenever it is economically feasible to do so.

Increase in price is the greatest conservation agent in the world. When the price of any commodity is so low that the cost of conserving it is equal to or greater than the value of the commodity, it is hardly worth conserving. For proof of this statement in the field of natural gas one may look to conditions which now exist in the state of California. Waste of gas in that state has been reduced to a minimum. Only in fields of small capacity and not near a pipeline or in fields from which the supply is not dependable for continued production, is gas being flared, and this in small amounts. California's answer is a substantial market and a reasonable field price—one which ranges from 6 to 12c per mcf.

TABLE 2. PAST ESTIMATES OF RESERVES.

Year	*Trillion cu. ft.*	*Estimate by*
1919	15.0	Shaw
1926	23.0	Source unknown
1931	46.0	Earle P. Hindes
1935	62.0	Ralph E. Davis
1938	66.0	Ralph E. Davis
1939	70.0	Lyon F. Terry
1941	85.0	Ralph E. Davis
1942*	85.0	Ralph E. Davis
1943	110.0	PAW
1944	90.0	Ralph E. Davis
1945	135.0	Alec M. Crowell
1945	140.85	DeGolyer and MacNaughton

NOTE· The estimates by PAW, Alec M. Crowell and DeGolyer and MacNaughton are known to include solution gas. Those by Ralph E. Davis generally do not include solution gas.

*The 1942 estimate by Davis is as of Oct. 1, 1942. The other estimates are as of the first of the given year!

Unitization of the Haynesville Field

DEDICATION of a modern pressure maintenance and liquid hydrocarbon extraction plant constructed by the Haynesville Operators Committee and located in the Haynesville Pettit Lime oil field in Claiborne Parish, La., and Columbia County, Ark., took place on June 1.

The field is currently producing approximately 6000 bbls. of oil and 16 million cu. ft. of gas daily. Of the gas produced, approximately 13 million cu. ft. is injected into the reservoir and the balance is used as fuel or consumed as shrinkage.

First gas was injected back into the formation on Jan. 24, 1945, and there are now six wells used as injection wells. The extraction facilities were placed in operation on March 16, 1945, and, the plant is currently producing approximately 16,000 gal. of natural gasoline, 400 gals. of iso-pentane and 10,000 gals. of butane per day. These products are used in blending 100-octane aviation gasoline.

The Pettit Lime Field now has 180 wells completed at depths from 5300 ft. to 5500 ft. Early development was on the Louisiana side of the Arkansas-Louisiana state line in Claiborne Parish, La., while later development saw a considerable extension of the field northward into Columbia County, Ark. The unit area consists of some 13,620 acres, and there are approximately 1400 royalty owners.

Soon after development started in the Pettit Zone of the Haynesville Field in the early part of 1942, it became the desire of engineers and operators to conserve the gas that came from the reservoir with the oil and compress this gas in a compressor plant for return to the producing formation. Repressuring had successfully been accomplished in gas-condensate fields producing from sand formations, and the indications were that it probably would be feasible in an oil reservoir having characteristics of the "tight" limestone of the Pettit Zone. In April 1943, engineers of The Ohio Oil Co. presented the first formal report on the subject to the newly-organized temporary Haynesville Operators Committee.

A temporary Royalty owners Committee was also formed.

Final plans agreed upon called for a plant to process 15 million cu. ft. of gas per day, extract gasoline and other hydrocarbons therefrom, and compress the residue gas for return to the ground. It was estimated that approximately 6,250,000 bbls. of oil will be recovered over and above what would have been recovered without repressuring. In addition to this, approximately 1,600,000 bbls. of gasoline and other vital hydrocarbons will be recovered. Investment in plant and pipe line systems approximates $2,000,000 but this is largely offset by saving in pumping equipment investment. The plant operating life is estimated at 20 years.

Effect of Recent Supreme Court Decisions on the

PRODUCTION AND CONSERVATION OF GAS

IF THE present trend of recent Supreme Court decisions affecting the natural gas industry continues unchecked, the Federal Power Commission will eventually find itself master of the field and arbiter of the price of all well-head sales of gas where eventual transportation in interstate commerce is involved.

In my opinion, any practice on the part of the Federal Power Commission which consists merely in reducing rates for gas sold by a certain few pipe lines, through seizing upon the fact that they may enjoy lower than average production costs in the gas fields—a practice exemplified in the Canadian River Company case—cannot fail in the end to prove highly inimical to the principles of true conservation, cannot fail to hamper the states both as to conservation and as to their taxing powers, and cannot fail to harm the underlying interests of royalty holders and all other persons in the producing states who are interested in having natural gas produced and marketed at prices fair to all.

Every Producer Affected

If the wind continues to blow in its current direction, it must be evident that every individual leaseholder, every royalty owner, and every producer of gas, including gas produced in association with oil, in all of the nation's oil and gas fields where pipe line gas is being produced, will eventually find himself and his interests involved in the actions of the Federal Power Commission.

At the other end of the transporting pipe lines, every natural gas user will inevitably discover that he also has a personal stake in the outcome of this controversy, for the reserves which now seem reasonably to guarantee future supplies of gas to such consumers, in connection with many pipe lines, may well become seriously affected before this storm is over.

The Federal Power Commission must find little to crow over—for it will obviously have to walk a highly precarious, legalistic tight rope which may in practice prove extremely difficult to negotiate. The State regulatory authorities, on the other hand, had supposed that they possessed at least some powers over production and gathering operations, but if these recent decisions stand, the states will assuredly be faced sooner or later with Federal regulations affecting every phase of production—for when a regulatory agency controls the purse strings of an operator it effectively controls everything the operator does.

Finally, the face of Congress should be red, for the Justices of the Supreme Court have laid the responsibility in this situation fairly upon the legislature, by their cramped construction of its carefully chosen words forbidding the regulation of production and gathering by the FPC under the Natural Gas Act.

It seems clear that the Canadian River decision does not in any sense constitute the last judicial word we are to hear on this subject. In fact, the attorney for the Federal Power Commission must at this juncture find it most difficult to advise that body. In the light of the curious division of the Court in this clearest possible case for the assumption of this power, the Commission's house seems to rest on a bank of not too solid sand.

The alternative apparently involves a single simple principle—the recognition that natural gas is a commodity to which the laws of supply and demand naturally and inevitably attach a price. That price is not necessarily, or even primarily, governed by Federal regulation of the rates of interstate pipelines.

Science is rapidly developing other uses for natural gas, and for the processing of gas into many merchantable products not dependent on pipelines for transportation and sale. The field prices may, and doubtless will, vary, depending upon the uses to which particular gas may be intended to be put, the regularity and amount of the sales in question, and the size and type of the reserves placed behind such sales. And prices will also tend to vary from field to field for local reasons. But in essence the recognized field price seems to be reasonably ascertainable, and to afford a solid foundation, fair on an overall basis both to the industry and to its patrons.

If such a criterion were to be adopted by the Commission, many of the difficulties which now confront that administrative body in this area of regulation would at once dissolve. Moreover, if this apparently sensible program should eventuate—as the result of action by the Commission itself, or as the result of further court action or perhaps of legislation—much of the existing confusion now perplexing this important industry would quickly be dissipated.

Confusion Dissipated

Indeed many producers who today would thus actually rather waste gas into the air than subject themselves to the hazard of possible Federal regulation could — and doubtless would—offer such gas to pipe lines capable of taking it, if the atmosphere were cleared in the manner suggested. Royalty owners and independent producers would then be assured fair and equal treatment, measured by the laws of supply and demand, which apply to every other transaction involving produced gas. Pipeline companies could afford to attach adequate, long-time reserves to their lines, by ownership or contract, knowing that they would not be penalized for early entrance into any gas field. And consumers at the outlet ends of the transmission lines would not be subjected to the hazard (now unquestionably present) of having the reserves behind their service diverted by their owners by one means or another to more stably remunerative uses, or of having their rates based in some cases on production costs which may exceed the generally recognized field prices.

The imperative task is to take, without delay every necessary step to resolve these issues, once and for all, on the basis of sound economics, in the interest of all concerned. If those affected by this situation halt or hesitate at this juncture, the only result will be to render the existing confusion worse confounded.

Summary and excerpts from an address by CARL I. WHEAT, Washington attorney, presented before the Interstate Oil Compact Commission quarterly meeting, at Oklahoma City, June 16, 1945. Mr. Wheat, who has represented the Independent Natural Gas Association of America, as intervenor, in several recent court cases, including the Canadian River and Memphis cases, was the principal speaker representing the industry in a panel discussion on "The Effect of Recent Supreme Court Decisions on the Production and Conservation of Natural Gas."

TRAINING PROGRAM
for Gas Appliance Servicemen

No. 1. A Suggested Plan For the Smaller Gas Company

By C. C. WESTMORELAND

THE TRAINING of employees—and that includes those doing customer service work—is being carried on constantly within all companies, whether or not it is recognized as such. If this fact were not true, the gas utilities could not possibly fulfiill their responsibility to the public, because even the simplest job must be learned through some form of training.

Even "trained" empolyees such as draftsmen, typists, welders, etc., must be taught how to apply their special knowledge and talents to their particular gas industry job. Other job classifications, by their very nature, require that employees undergo complete training by the utility. Such classifications constitute the greatest training problem. The appliance adjuster or appliance serviceman falls into one of these.

The value of a service training course is recognized by all, even by representatives of utilities which have not as yet developed a formalized program. During this war period, formalized service training has helped many companies solve manpower and operating problems. And most companies, anticipating radical personnel increases in the keenly competitive post-war period, acknowledge the need for a training procedure that will make productive workmen of new employees in the shortest possible time.

Small Company Problems

Both large and small companies have felt the acute need for training. The small companies, however, have in at least a few cases, been discouraged by what appears to be an insurmountable task. Their most troublesome problems are:

1. Cost of an elaborate training course.
2. Wide geographic distribution of holdings.

While both problems are real, they are not as serious as may appear.

First, a training course must not necessarily be elaborate in order to be effective. It can be tailored to fit the particular company's requirements. All that needs to be done to make a start is to ask and answer two questions.

1. How many appliance servicemen will it be necessary for us to train in a year?
2. How much money can we invest in each person in order to get the type of service we want?

Large companies have spent considerable money in accumulating training equipment which makes it possible to shorten the training period. Smaller companies, not able to bear such a financial load, can sacrifice some speed in training and materially reduce the investment necessary in training equipment. The only advantage that extensive equipment offers is that employees can experience more situations in the classroom in a shorter period of time, thus reducing the amount of field training necessary in order to reach proficiency. A suggested basic list of equipment needed for classroom training is shown in Table 1. Most of this equipment is available to the utility at little or no cost.

Wide geographic distribution of holdings makes it necessary for the smaller gas company to use supervisory talent in training employees. The Job Instruction Training program, sponsored by the War Manpower Commission, demonstrates clearly that supervisors can be effective in training employees when given sufficient assistance.

In fact, it is generally recognized that a supervisor's relationship with his employees is strengthened if he takes an active part in their training.

Organizing the Training Program

The supervisor, however, cannot be expected to carry the entire load. He needs help in organizing and planning the training program. It is advisable for the program to be formulated in written form by one person or one group in order to assure uniform coverage of all points. Then it can be offered to the supervisors as a training guide. Such an arrangement places the responsibility for keeping the training program abreast of operating procedures, which is decidedly essential. Even a utility which finds it necessary to train only one serviceman in a year should establish a formalized training procedure in written form. The primary reason for this is that it is more difficult for the smaller utility to replace personnel losses through retirement in turn-over than it is for the larger utility which has the advantage of greater flexibility.

The first step in organizing a course of training is to decide specifically what is to be taught. That statement may sound absurdly obvious, but when the problem is investigated, there are significant differences of opinion among the supervisory groups concerning the job duties of the appliance mechanic. A decision by management, uniformly understood and accepted by participating supervisors, must be reached before a uniform training program can be established. With the job duties established, the knowledge and skills used by the existing working force in performing their duties should be studied to determine what material should be included in the course of instruction.

Much of the material so obtained will be fundamental principles and points of specific knowledge which can be treated in classroom discus-

sion and demonstration. Other items will consist of skills of a manipulative nature. Such points should be scheduled as a part of the field experience which should supplement the classroom instruction.

The distribution of the training time between classroom instruction and field instruction will depend on a number of factors, but principally upon the amount of money available to spend on training props and equipment. It is feasible to conduct practically all of the course in the classroom provided numerous appliances, controls, and other training props are available to give the student a wide background of experience with equipment normally encountered in the field. Such an investment obviously cannot be justified unless it is used frequently. If, on the other hand, replacements in the service groups are infrequent, the classroom phase would be shortened and the time spent in the field increased. The advantage of more equipment lies in the fact that students can learn more rapidly in the classroom where the conditions can be closely controlled to teach a particular point, thus shortening the overall training period.

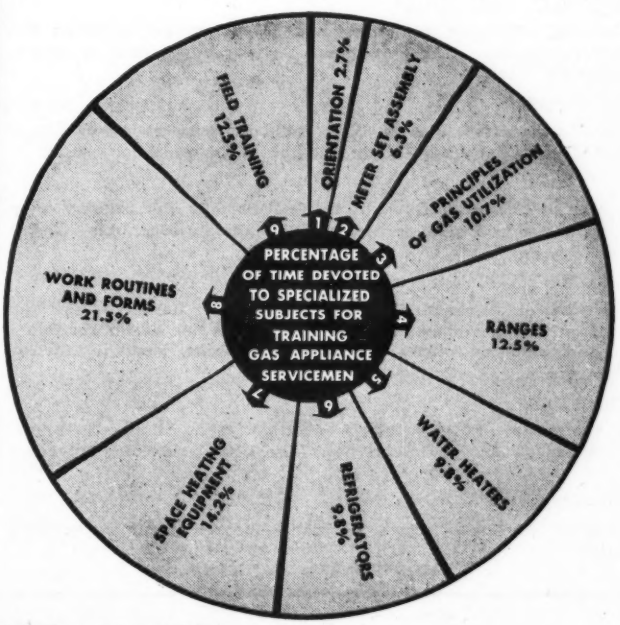
EMPLOYEE TRAINING is not the expensive luxury of large companies. It is an essential operation in preparing most new employees for their jobs. As such, it should be organized and controlled, as are other essential functions, rather than left to chance development. Those of us in employee training who attended the War Manpower Commission's Job Instruction Training Course watched the instructor tie the underwriters knot at least three times, but we were still unable to duplicate the knot because the learning steps had not been broken down and organized in a manner conducive to learning. The same principle applied to any learning process.

This is the first in a series of articles based upon the experience of one large utility in adapting the J.I.T. program to the training of appliance mechanics. The series will offer specific examples of training techniques and training methods used in developing a plan which integrates classroom lectures, slides, drawings, demonstrations, and manipulations by students with planned field experience to achieve the objectives of (1) a shortened training period; (2) more uniform instruction of new employees resulting in greater uniformity of operating procedures. Subjects to be covered in the series are (1) Orientation; (2) General Principles of Gas Utilization; (3) Meter Set Assembly Work; (4) Ranges; (5) Water Heaters; (6) Refrigerators; (7) Space Heating Equipment. The series supplements an article, "Classroom Training of Domestic Servicemen," which appeared in the January, 1945, issue of GAS.

Sequence of Course

The organization of the training material into proper sequence for ease of learning is of prime importance and should be carefully considered. It is easy for an operating man to be mislead by operating experience on this point.

It is customary to think of service work in terms of the type of order executed. Such thinking is valid when considering completed work assignments, but is not valid as a basis for organizing training material. To illustrate, we think of a serviceman's work as consisting of the execution of various types of orders, such as turn-on orders, close orders, meter change orders, etc. When we examine those various work assignments from the standpoint of skills or knowledge needed for their execution, we find that a great variety of operations are involved in order to complete a given assignment. For instance, a turn-on order, in most companies, involves meter work, appliance work, and clerical work with many subdivisions under these general headings. From the operating standpoint, a turn-on order is one unit. From the standpoint of learning it consists of many units, which are common to many orders.


PERCENTAGE OF TIME DEVOTED TO SPECIALIZED SUBJECTS FOR TRAINING GAS APPLIANCE SERVICEMEN
ORIENTATION 2.7%
METER SET ASSEMBLY 6.3%
PRINCIPLES OF GAS UTILIZATION 10.7%
RANGES 12.5%
WATER HEATERS 9.8%
REFRIGERATORS 9.8%
SPACE HEATING EQUIPMENT 14.2%
WORK ROUTINES AND FORMS 21.5%
FIELD TRAINING 12.5%

It is better therefore, to organize the training material on the *basis of the necessary skills* required, rather than on the *basis of work units completed*, in order to achieve maximum value from the training time. On this basis, the training course should be broken up into subject matter such as meter set assembly work, range adjustments, water heater adjustments, refrigerator adjustments, etc., rather than on the basis of turn-on meter procedure, close meter procedure, change meter procedure, etc. The amount of time that can be devoted to the training of any one person must be determined by each company. The percentage of time to be given each of the subdivisions in the course is suggested in Fig. 1. A suggested breakdown for a formalized course is shown in Table 2.

Field Training

The field experience phase of the training should be scheduled on a similar basis. After the student has received classroom instruction on a given operation, he should be sent into the field with a qualified person, familiar with the training course, for field application of the principles discussed in class. The field experience should follow the classroom experience as rapidly as possible in order that the student may quickly apply the material learned in class.

The amount of field training necessary to definitely establish the points firmly in the student's mind obviously will depend upon the nature of the work encountered in the field. If possible, the work assignments assigned to the student should be carefully selected with the view of including the type of work which has been studied in class. The student should not be held responsible for those phases of the work not yet covered in the classroom training. Those operations should be performed by the field instructor accompanying the student. In this manner, the student will complete an increasing percentage of the work encountered in the field as he progresses through the subject matter of the course.

TABLE 1. BASIC FACILITIES NEEDED FOR CLASSROOM TRAINING OF APPLIANCE SERVICEMEN.

(To be Determined by Requirements of Utility)

METERSETS REPRESENTATIVE OF THOSE USED BY THE UTILITY

Low pressure, high pressure, multiple, curb, tin, iron.

A FEW REPRESENTATIVE APPLIANCES COMMONLY ENCOUNTERED ON THE UTILITY'S LINES*

Range or ranges; water heaters, tank, automatic thermostorage, and instantaneous; forced-air heating unit, gravity furnace, auxiliary heating equipment; refrigerators, both air and water cooled.

REPRESENTATIVE APPLIANCE ACCESSORIES*

Heat controls, automatic pilots, timing devices, etc., for range, water heater, heating equipment, and refrigerator.

MANUALS

Company manuals regarding service procedures. American Gas Association appliance manuals. Manufacturer's service literature.

MISCELLANEOUS CLASSROOM EQUIPMENT

Desk chairs, blackboard, projector for slides.

*Drawings and photographs can be used to a limited degree as substitute for actual appliances or accessories in order to reduce cost.

Clerical Forms

In most companies a part of the appliance service mechanic's duties consist of using the necessary clerical forms related to his job. The amount of clerical work expected of the appliance adjustor varies considerably, depending upon the complexity of the company's organization and the relationship of the adjustor to other departments. When the numerous meter tags, requisition forms, collection forms, application forms, parts forms, and the various types of work assignment orders are totaled, the sum may equal 25 or 30 different pieces of paper that must be handled by a man hired to do a job of a mechanical nature. The instruction of field mechanics on proper form usage has a long history of being a difficult problem.

The type of man usually found in a service organization is a person who is primarily interested in mechanical work and who was attracted to the job for that reason. As a result, he is inclined to have more aptitude along mechanical lines. Such people are not interested in clerical work and look at it as being a "necessary evil" *incidental* to their job. That attitude can at least be improved if the necessity for correct and complete usage of forms is emphasized in training. The relationship of interdepartmental functions and the difficulty caused by lack of uniformity should be stressed to show the importance of the onerous "paper work." Improving the group attitude toward "pencil pushing" will not, by itself, correct the difficulty. It is only the foundation upon which to base sound instruction.

If the instruction relating to the clerical phase of the job is organized as a unit in the course and treated as a separate subject, the volume of forms discussed is likely to stagger the student. A method based on the "association" principle of learning will be more effective. We know that we can establish a new habit more easily by associating the new behavior pattern with habits already established.

That technique can be applied in teaching order form procedures to appliance servicemen by discussing the appropriate forms or parts of the forms in conjunction with the mechanical work. That is, the clerical work relating to ranges, water heaters, or meters would be covered when the operation involved in range adjustments, water heater adjustments, and meter work are discussed. When this method is used only a few forms which do not relate to a mechanical operation will need specific attention near the end of the course.

Props Needed for Classroom Instruction

A few meter sets, a few appliances and mounted controls, plus the usual furnishings of a classroom, are almost essential for even a modest program. (See Table 1) A moving picture projector may be helpful, but to date there are few films available which relate to the appliance mechanic's job. Unless the projector can be used in other activities, its cost can hardly be justified until training films are developed by the gas industry.

Drawings and pictures should be used when possible. The old Chinese proverb regarding the picture versus

TABLE 2. SUGGESTED BREAKDOWN OF TRAINING COURSE FOR APPLIANCE SERVICEMEN

ORIENTATION

Introducing the serviceman to the gas industry, his company and its customers. Background knowledge that will give him confidence in acting as the company's representative in his contacts with the customer.

GENERAL PRINCIPLES OF GAS UTILIZATION

General information that will help the serviceman solve unusual problems not specifically covered in training. Gas Properties—Combustion—Burner Design—Heat Transfer—Automatic Control.

METER SET ASSEMBLY WORK

Pressure Regulators—Displacement Meters, High and Low Pressure Meter Sets—Pipe Fitting, Related to Meter Set Work—Meter Reading—Soap and Spot Testing.

RANGES

Service adjustments on top burners—Oven burners—Automatic and standby oven pilots—Broiler—Bi-metal, rod and tube, and hydraulic temperature controls—Clocks and timing devices.

WATER HEATERS

Principles of "conduction and convection" as applied to water heating—Tank and automatic thermostorage and instantaneous water heaters—Water heater controls—Water temperature and liming as related to tank failure—Vents, venting, and testing for vent performance.

ELECTROLUX REFRIGERATORS

The burner—the thermostat—water controls—control testing methods—burner adjustments—the "Operation Analysis Chart"—A "five point" checking procedure for unit failure.

SPACE HEATING EQUIPMENT

Floor furnaces—gravity furnaces—forced air units—furnace controls—auxiliary heating equipment.

the 1000 words is certainly true in discussions relating to basic principles or specific points of knowledge. The size of the classes will determine the best method for showing the pictures or diagrams. Large groups necessarily require large diagrams or pictures which makes a slide projector useful. However, small groups of eight or ten people are desirable, which makes the use of blown-up photostat prints preferable. When large prints rather than slides are used, it is possible to have normal light and ventilation in the room which is more conducive to alertness than a dark, tightly closed room.

Equipment such as controls which have been cut away or mounted as operative training props are helpful in demonstrating how the basic principles are applied by manufacturers.

Most manufacturers realize that it is to their advantage to have their product thoroughly understood by service groups and are very cooperative in furnishing supplies. Some firms have even offered to furnish and mount the controls at no cost to the training group. Almost all of them are willing to sell controls used for training purposes at a decided discount so that a stock of representative appliance accessories need not represent an exhorbitant investment.

Checking Effectiveness of Students

After the student has been released from training and is working on his own, some means of determining his effectiveness on the job should be established. This may require inspection of his complete work in the field, observations by supervisors riding with him, or by a study of his orders which require a second call. Regardless of the method used, it is essential that some sampling process be established in order to evaluate the effectiveness of the training program and offer a basis for revisions to increase its effectiveness.

The course briefly described in this article does not endorse discontinuing actual experience as a valid means of instruction. It does, however, emphasize the advisability of giving new employees basic information that will make the experiences meaningful. The experience should also be organized as much as possible into logical steps, which make rapid learning and retention possible.

(The second article in this series by Mr. Westmoreland covering "Orientation," will appear in the August issue of GAS.)

At the June meeting of the Interstate Oil Compact Commission in Oklahoma City (left to right: Hiram M. Dow, New Mexico; Reford Bond, Oklahoma; Richard McEntire, Kansas; and Carl I. Wheat, Washington, D. C.

IOCC Outlines Policies at June Meeting

By O. D. HALL
Midcontinent Editor

THE oil and gas producing states which have not already done so, "should adopt an alert and aggressive policy in enactment and enforcement of legislation to bring about a proper development of natural gas resources and a rigid enforcement of sound conservation policies," declared a resolution adopted by the Interstate Oil Compact Commission, in its Summer meeting at Oklahoma City, Okla., June 14-16. Such a policy "is the best insurance against intervention on the part of the Federal Government in the matter of production and gathering," which the commission believes should be the exclusive functions of the sovereign states," the resolution concluded.

Minority opinions in connection with the Canadian River and other gas rate case decisions, indicate a decided trend in the direction of Federal control of such functions, Carl I. Wheat, Washington, D. C., attorney for the gas industry, said. In the Canadian River case the FPC could reasonably have complied with the intent of Congress in enacting the Natural Gas Act, by merely omitting the company's gathering properties from its adopted rate base. Certainly no one seems "originally to have conceived of the Natural Gas Act as conferring on the Commission (FPC) authority to regulate either the physical operations of production and gathering, or the rates to be charged for gas at the well-head in the field, or at the discharge end of a gathering system," the speaker declared.

The application of original cost to production property is not only "harmful but almost fatal to the cause of conservation of natural gas," Richard B. McEntire, chairman of the Kansas Corporation Commission declared. He suggested two possible remedies. First possibility would be fixing a fair price for the commodity at the well-head. Second, "would be even more drastic and is of a character that almost makes one hesitate to recommend it. It would be a legislative mandate divorcing production and gathering activities from transmission and sale."

The matter of "field price" as a consideration for rate making by the FPC was opposed in a paper by Charles V. Shannon, general counsel of the FPC, read by A. A. Hammer, of Fort Worth, Texas, senior engineer of the Commission. "It appears fair to say that the Commission, in allowing the actual costs to the pipeline companies of producing natural gas, has been following the intent of the Natural Gas Act, the paper asserted.

Recent court decisions do not authorize encroachments on the rights of states to regulate the production and gathering of natural gas within their borders, concluded John G. Hervey, Dean of the Law School, University of Oklahoma, but he declared that minority opinions indicate a trend in the direction of such Federal control. "The natural gas industry must demonstrate a consciousness for the public welfare and cooperate with state regulatory bodies and the Federal Power Commission in setting up a workable conservation and regulation program, or Federal control will result," Dean Hervey warned.

"An adequate price for natural gas is the greatest conserving agent in the world," declared Dr. E. L. DeGolyer, Dallas geologist. (See p. 19.)

TECHNICAL PHASES Of Overland Pipe Pressure Welding

By E. P. JONES
General Superintendent, Pressure Weld Company

FIG 1. The welding machine, a self-contained portable unit, can operate under all kinds of right away conditions.

THIS article covers the technical phases of the new semi-automatic pressure welding process, as applied to overland pipelines of which there are to date approximately 1280 miles in operation.

Articles on this subject published in GAS include one, which appeared in the Nov., 1944 issue which covered briefly the application of this process during the construction of certain segments of the Tennessee Gas and Transmission Co. 24-in. line from Corpus Christi, Texas to Cornwell Station, W. Va. Previously a general article appeared in GAS for Oct., 1942. The welding machine is pictured in Fig. 1.

Advantages

There are several inherent advantages of the pressure welding process over former methods of welding, for pipeline construction. These are listed in Table 1. Fig. 2 shows maximum and average number of pressure welds made per 10-hour work day.

Crew and equipment requirements are given in Table 2.

Pressure and Temperature

Pressure welds in pipe require from 3000 to 4000 psi based on the area of the pipe cross-section. This pressure is ordinarily and conveniently supplied by a hydraulic pump acting through hydraulic cylinders. Aligning and gripping the pipe during welding is also accomplished hydraulically.

The hydraulic equipment is mounted on the tractor as shown in Fig. 3. An auxiliary drive from the tail shaft of the tractor operates both the hydraulic pump and cooling water circulating pump. Control valves for the hydraulic system are placed within easy reach of the tractor operator.

Temperatures for pressure welding are within the range of 2100 to 2500 F. This obviously means that no fusion takes place and that welding and the merging of the mating parts is the result of plastic deformation and recrystallization across the junction.

PIPELINE PRESSURE Welding, during the past few years, has proved to be a revolutionary departure in pipeline construction. High quality welds, according to the author, have been produced under all conditions of weather and terrain. The process has eliminated the so-called "Monday morning" welding. Welding crews have been reduced from 50 to 300%; auxiliary equipment from 20 to 300%, depending upon the size of pipe being welded. The elimination of electrodes and welding rods during these war years has proved an important factor. As the author put it, if the progress shown in the use of this method during 1944 is of any significance, this year and those to come should record large gains in the number of pipelines to be pressure welded.

Welding heat is supplied from water cooled oxy-acetylene welding heads placed so as to impinge simultaneously about the entire periphery of the joint. The welding heads for 24-in. pipe are shown with flames burning in Fig. 4.

Thickness and Welding Time

Pressure welding has been applied to a wide range of thicknesses and in line pipe will handle any wall thickness now in use.

Welding time is a function of material thickness. Fig. 5, shows average welding times for various wall thicknesses of line pipe, while Fig. 6 gives the approximate savings in welding rod.

Materials

Carbon steels of low, medium, and high carbon varieties have been pressure welded. In the alloy steels, low alloy steels of the low and medium carbon range are readily welded, as are many special steels such as tool steel 18-8 stainless, etc.

All grades of line pipe are pressure welded. Casing pipe has been pressure welded experimentally, with good results.

Pressure welding has been used continuously in the joining of tool joints to drill pipe, an operation demanding the utmost in joint quality.

Weld Characteristics

There is no "cast structure" characteristic of fusion welded materials. The grains which form on normal cooling are ordinarily somewhat larger than similar grains in the base metal, this being the result of austenitic grain growth at the welding temperature. This may be easily refined if desired by normalizing but the properties of the metal in the weld zone in line pipe have not been altered sufficiently to warrant such a treatment.

Fig. 7 and 8 illustrate typical grain structure obtained in pressure welded line pipe in the as-welded condition. Fig. 7 is at 100 magnifications and Fig. 8 is the same weld at 500 magnifications. Complete coalescence of the structure across the weld interface has resulted so that no trace of the original joint can be found.

High quality welds are obtained under all types of field conditions. An example which illustrates this, is the results of laboratory tests made during the recent construction of the 24-in. OD by .250-in. wall thickness pipeline of the Tennessee Gas and Transmission Company. More than 4700 physical tests were made during the pressure welding of the 320 miles of pipeline. Of the samples tested, the ultimate tensile strength averaged above 75,000 psi with elongation across 2-in. centers transverse to the weld of approximately 25%.

TABLE 1. ADVANTAGES OF PRESSURE WELDING PROCESS

1. It is a semi-automatic process in which operator skill plays a minor role.
2. High weld quality is obtained without appreciably altering the physical properties of the pipe material.
3. Welding times are short, averaging approximately one minute per quarter inch of pipe wall thickness. High daily rates of production result.
4. The welding machine is a self contained portable unit which can operate under all kinds of right of way conditions (Fig. 1).
5. A reduction in the pipeline welding crew and auxiliary equipment results in all sizes of pipe to be welded.
6. No welding rods or electrodes are required. The weld is made in the pipe material without resort to fluxes, etc.

TABLE 2. CREW AND EQUIPMENT REQUIREMENTS FOR PRESSURE WELDING

1. Pipe-End Preparation Crew

Consists of: One man and one helper operating a portable grinder. One pick-up truck driver.

Equipment: Pick-up truck. Portable 1500 Watt DC or AC gasoline-driven generator. 7-in. or 9-in. heavy duty grinder and specially designed jib.

2. Line-up and Pressure Welding Crew:

Consists of: One foreman. Two pressure weld clamp operators. Two side-boom tractor drivers. One tractor swamper. Three to five common or semi-skilled laborers. One combination water truck driver and auxiliay man.

Equipment: One suitable side-boom tractor for line-up. One side-boom tractor equipped with special hydraulic controls (size of tractor depends on size of pipe to be welded). One pressure welding clamp (size varies with size of pipe). One trailer attached to tractor with oxygen manifold, acetylene generator, beveling machine and torch, and two wrinkle-bending torches. One 1200 to 1500 gallon tank on 1½ to 2 ton truck.

During extremely hot weather, it has been found that considerably more progress can be made by having one spell-off pressure welding operator.

Where speed has been essential, pressure welding has been successfully and economically carried out at night by arranging lights on the welding tractor.

FIG. 1A. Trailers with caterpillar tracks are used in extremely rough going.

Pipe Preparation

One of the most important phases of the pressure welding process is the preparation of the joint for welding. Inspectors are taught to pay as much attention to this as to the actual welding process.

All rust accumulations are removed from the end surfaces of each pipe before welding. Oxides remaining on the beveled faces are entrapped during welding to lower weld quality. A rotary grinding rig, such as shown in Fig. 9, will maintain the correct bevel angle on the end of the pipe (5 to 10°).

A grinding technique has been developed which will remove all rust and scale uniformly from the end surface of the pipe.

In bad weather, mud and water accumulations are removed from the pipe. It is then rotated so that the wet lower quadrant will be on top so that it can dry before welding.

Two additional factors that are closely controlled is the removal of deep nicks and gouges from the ends of the pipe, and after oxy-acetylene cutting of the pipe complete removal of the blue oxide scale by grinding.

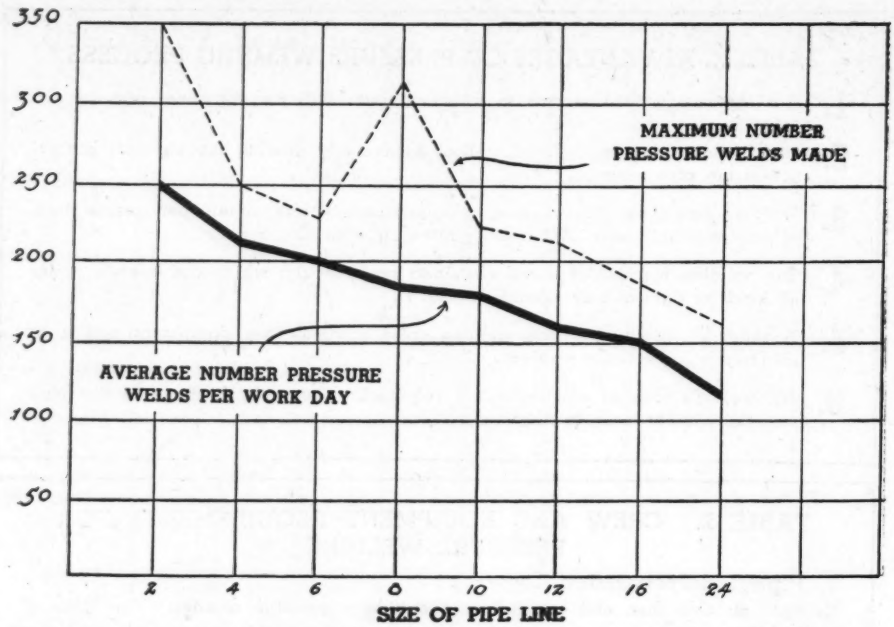


FIG. 2. Data compiled from various jobs. Shows maximum and average number of pressure welds made per 10-hour work day.

uniformity and correct adjustment so as to burn with a slight excess acetylene feather.

The flames are maintained over the weld joint with a slight amount of reciprocation to either side of it. When the weld groove starts to close under the effects of the welding heat and low end pressure, the final welding end pressure (equal to 3000 to 4000 psi of joint cross-section) is applied. This produces rapid upsetting of the plastic metal in the weld zone. When a pre-determined amount of shortening occurs, a limit switch operates an electric signal to warn the operator, and he reverses the hydraulic pressure to the cylinders. Thus each weld will be identical with the previous one. The upset obtained is usually equal to, or slightly greater than the wall thickness of the pipe being welded.

The outside surface of the weld joint is usually lightly fused at the

Pipe Alignment

Accurate alignment of the pipe to be welded, in the welding clamp, is important. The usual practice is to support the previously welded pipe near its end on skids at the correct height so that easy access of the welding clamp and the next length of pipe is assured.

A chain suspended from the tractor boom or "Jack-boards" is used to support the end of the next pipe being positioned for welding. This produces conditions such that the welding clamp can be readily lowered into position over the joint to be welded. Lineup crews are schooled to efficiently handle the pipe into the welding clamp so that little time is lost in this operation.

Unusual outages caused by dented pipe ends are recognized and corrected before the time that the welding clamp is ready for the pipe. However, cases arise where short sections of mis-alignment are quickly corrected by a few hammer blows while the clamp is on the pipe. Also, mill tolerances permitted in the diameter of the pipe often are such that accurate alignment cannot be secured; but this amount of mis-alignment is not detrimental to weld quality. However, the surface appearance produced is often non-uniform.

Welding Operation

An initial end pressure of 1000 to 1500 psi of the joint cross-section is applied. This holds the pipe ends in intimate contact during welding. The gases from the welding heads are ignited and the flames are checked for

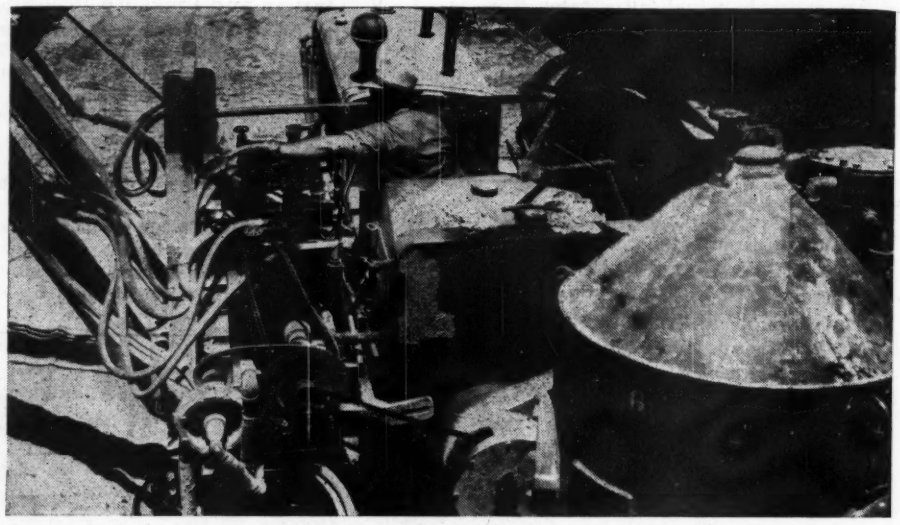


FIG. 3. View of hydraulic equipment mounted on tractor.

FIG. 4. Welding heads for 24-in. pipe with flames burning.

end of the weld cycle to remove any trace of the original abutting edges and produce a more uniform appearance to the weld.

It is very important to support the newly completed weld joint until it cools sufficiently to acquire strength. A sudden movement of the pipe directly after extinguishing the welding flames can easily tear the weak plastic metal. On pipe other than the "big inch" sizes, this factor is of less importance because the pipe is more flexible and easier handled.

Although the welding process is semi-automatic in nature, many checks are made each day to assure correct operation and high weld quality. Each morning the welding machine and crew are qualified by making a weld which is tested on the spot. Testing equipment has been placed on the trailers so that results can be obtained at once, instead of waiting on laboratory results. Checks are made after any appreciable change in conditions is noted.

Gas Supplies

Oxygen and acetylene supplies are moved along the pipeline right of way on a trailer which is pulled by tractor upon which the welding clamp is mounted. Usually pneumatic wheeled trailers are used, but in swampy country or extremely rough going, trailers with caterpillar tracks are used.

Six oxygen cylinders are manifolded to supply the welding heads with gas. A seventh cylinder is used to operate the pipe beveling machine cutting torch. Acetylene is supplied from 150-lb. or 300-lb. generators, depending upon the size line being welded. These large generators have proved relatively trouble free under roughest conditions.

Summary

During the past few years, the introduction of pipeline pressure welding has proved to be a revolutionary departure in pipeline construction. It has been shown to produce high quality welds under all conditions of weather and terrain. It has eliminated the so-called "Monday morning" welding, of the past.

Pressure welding has shown these advantages while reducing the welding crews from 50 to 300%, and auxiliary equipment on the order of 20 to 300%, depending upon the size pipe being welded. It's elimination of electrodes and welding rods has proved an important factor in these war years.

If the activities of the year 1944 were of any significance, 1945 should show large gains in the number of pipelines to be pressure welded.

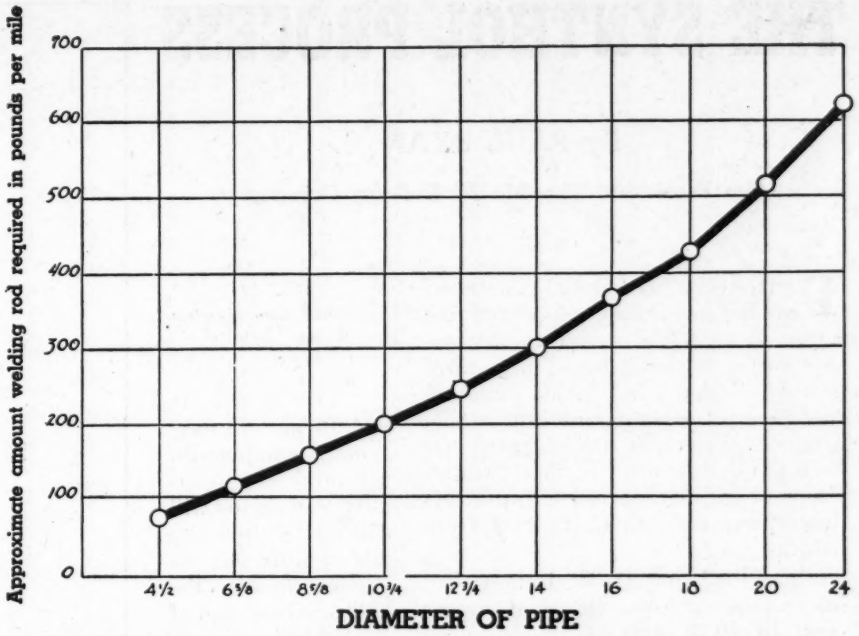


FIG. 6. Approximate savings in welding rod by using pressure welding.

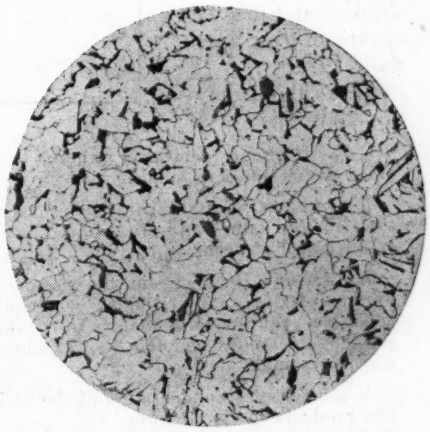


FIG. 7. Typical grain structure (100 magnifications) in the as welded condition.

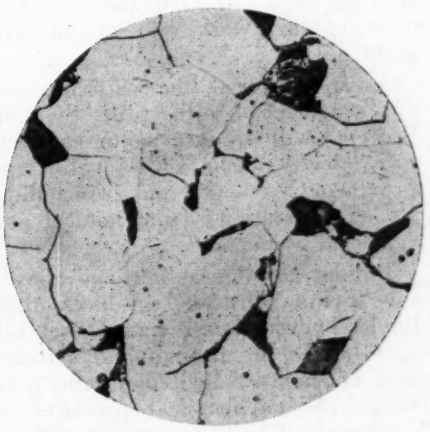


FIG. 8. Typical grain structure (500 magnifications) in the as welded condition.

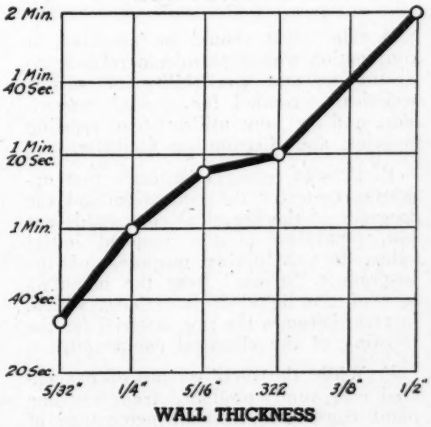


FIG. 5. Approximate time required to pressure weld various wall thickness pipe.

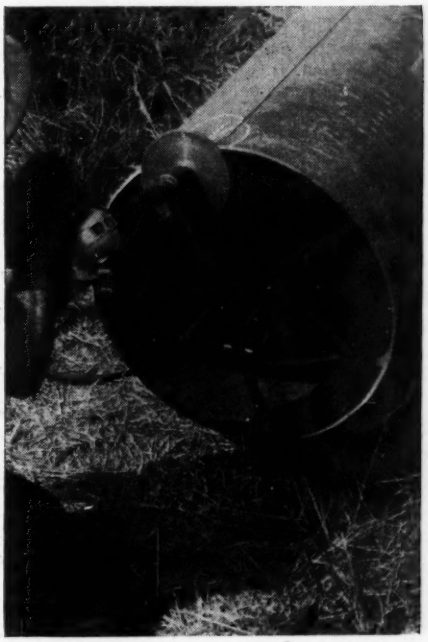


FIG. 9 (at right). Rotary grinding rig to maintain correct bevel angle (5-10°) on the end of the pipe.

THE SYNTHOL PROCESS

By PAUL RYAN

Vice President, The M. W. Kellogg Company

TECHNICAL research, stimulated by the war, has accelerated the tempo of prewar research on the conversion of hydrocarbons in natural gas, in oil shale, in asphalt sands, in coal, and in other forms into usable products. Principal among these has been the development of the "Synthol Process" for manufacturing liquid hydrocarbons and other products from natural gas.

Since 1935, the M. W. Kellogg Co. has conducted research on this process. In 1937, data on the Fischer-Tropsch Process were obtained by Kellogg. During the intervening years, Kellogg has pioneered the development of this work into commercial plant design.

As an answer to the wartime cries of "shortage of oil", this "Synthol Process" will produce motor gasoline (75 "clear" octane CFR-M) for approximately 5¢ per gal. (including 10% depreciation) from natural gas valued at 5¢ per Mcf.

Besides gasoline as outlined above, this "Synthol Process" produces other liquid hydrocarbons, e.g., Diesel oil (90-100 Diesel index) and butane, and, under controlled conditions, produces various chemical products in the form of oxygenated compounds. Changing the operating conditions will control the quantity and quality of the production of the hydrocarbons and of the chemical compounds.

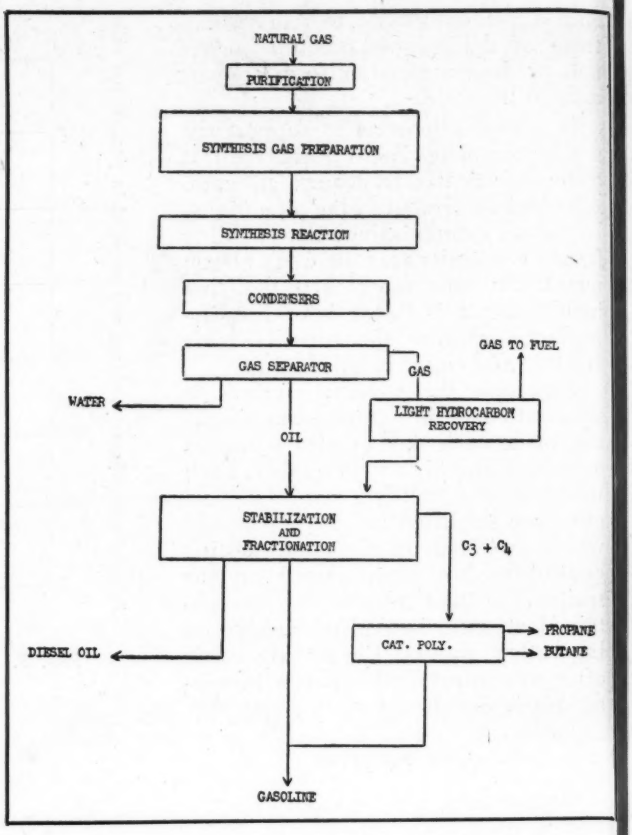


FIG. 1. Simplified flow diagram of the "Synthol Process."

Fig. 1 presents a simplified Flow Diagram of the "Synthol Process." It involves the following steps:

1. Purification—removal of sulphur and other deleterious compounds.

2. Synthesis Gas Preparation—conversion of the natural gas to carbon monoxide and hydrogen.

3. Synthesis Reaction—in the presence of the selected catalyst, under controlled conditions, conversion of the gas to the desired hydrocarbons and the desired chemical compounds.

4. Condensers—condensation of the various products to liquid form.

5. Gas Separator—separation of the oil layer containing the liquid hydrocarbons from the water layer containing the chemical compounds, and separating and recovering the light gaseous products.

6. Stabilization and Fractionation of the various liquid hydrocarbon products into gasoline and Diesel oil.

7. The liquid chemical compounds are separated and recovered.

A complete "Synthol" plant to produce a large volume of liquid hydrocarbons, it is presently estimated, would have a "pay-out-time" of approximately eight years. A combined "Synthol" and chemical plant, it is presently estimated, would have a "pay-out-time" of approximately three years. This acceleration in financial return is due to increased values of the chemical compounds over the values of the hydrocarbons.

In all these calculations the cost of 5¢ per gal. of gasoline from the "Synthol Process" includes no value for chemical compounds and is independent of the investment and profit from the operation of the chemical plant.

Kellogg's analysis of Synthol economics are shown in Table 1.

Evaluated under present economic circumstances, the factors of investment, of gas reserves, of cheap transportation, of marketing considerations and of understanding of chemical industries will create limitations which will undoubtedly serve to caution the wide-spread participation by many oil companies.

TABLE 1. ANALYSIS OF SYNTHOL ECONOMICS

A. The plant should be located close to large gas reserves. Approximately 11,000 cu. ft. of natural gas are required to produce one barrel of liquid hydrocarbon product. Foreseeable gas reserves should at least equal 10 years' plant requirements.

B. The plant should be located on water to achieve lowest cost tranportation for both kinds of products—hydrocarbons and chemical compounds. Location on the Gulf Coast, providing water transportation to the industries of the East Coast and to the upper Mississippi Valley, would be quite advantageous.

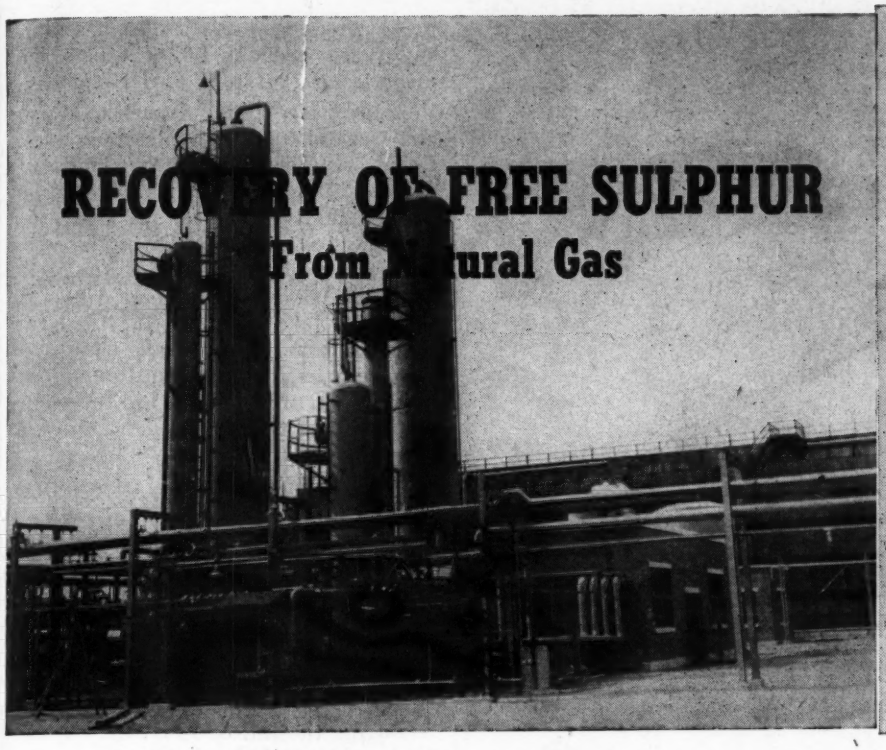
C. Undoubtedly, postwar Conservation Regulations of the Texas Railroad Commission, and of other States, will enforce "gas-oil-ratios." Continued satisfactory operation of a "synthol" plant, requiring large volumes of natural gas, would necessitate the location of the "Synthol" plant contiguous to a presently operating or newly built oil refinery to handle the large quantities of oil produced under these "gas-oil-ratios."

D. The plant should be operated in conjunction with a petroleum refinery to assure constant availability of skilled technical personnel for general supervision, and for joint utilization of existing refining and distributing facilities.

E. Present research indicates that operating costs for the separation and the recovery of the chemical compounds are low, regardless of the assumed initial value, for accounting purposes, of the by-product "stream" from the manufacture of the liquid hydrocarbons, which, in turn, becomes the raw material for the recovery of the chemical compounds.

F. While the total volume of oxygenated compounds produced from any one plant constitutes a small percentage of the total prewar, and estimated postwar, consumption of similar products by the chemical industry, the operation of many such plants by the petroleum industry might saturate the market for such chemical compounds and would adversely affect the profitability of such plants.

RECOVERY OF FREE SULPHUR From Natural Gas



Girdler sweetening and dehydration plant.

THIS IS THE STORY of the McKamie Gas Cleaning Co., a pioneer in a new field in the science of natural gas—the recovery of free sulphur. The company operates in the McKamie Gas Field in southeastern Arkansas, where each 1000 cu. ft. of gas carries about 5 lbs. of free sulphur. For a long time this gas was flared, causing several deaths and property damage. Then McKamie was formed as a non-profit subsidiary of the field's two principal producers, Standard Oil Co. and Atlantic Refining Co., and a plant was built that embraces a wide range in gas production, touching upon hydrates, compression, gasoline extraction, and desulphurization. A process has been worked out for the recovery of 98.7% of the hydrogen sulphide, converting it into pure sulphur at a cost of about 2c per Mcf. The authors, C. W. Cooper, vice president of Consolidated Natural Gas Co., New York and Howard Waddle, petroleum engineer, McKamie Gas Cleaning Co. first presented a paper on this plant before A.G.A.'s Natural Gas Department meeting in 1944. The present article, while based upon that paper, has been brought up to date.

THE McKamie Gas Cleaning Co. is a small corporation which has just completed a plant for treating the extremely sour natural gas produced in the McKamie Field in southwestern Arkansas. This natural gas is the sourest yet known, having a hydrogen sulphide content in excess of 4000 grains per 100 cu. ft.

At present the hydrogen sulphide content in the gas reaching the plant is averaging 4450 grains per 100 cu. ft.

To place this in proper perspective, it is interesting to note the sulphur concentration in other gases. Sour gas found in the Sissonville Field in West Virginia reached a maximum of 50 grains per 100 cu. ft. Sour gas from the presently active wells in the Amarillo Field in Texas in no case exceeds 162 grains per 100 cu. ft., with most of the sour wells being under 10 grains. The sourest natural gas previously encountered, the Chestnut Ridge Well of The Peoples Natural Gas Co. in western Pennsylvania, approximated 1500 grains of hydrogen sulphide per 100 ft.

The problem posed by this McKamie gas is better realized by considering that each 1000 cu. ft. carries the equivalent of about 5 lb. of free sulphur. The day's normal expected production of 26 million cu. ft. of gas brings the equivalent of about 60 tons of free sulphur out of the ground.

For many months this extremely sour gas was flared as a nuisance, causing several deaths, property damage, and much general complaint. But the problem of treating it was attacked late in 1941 and with the recent completion of facilities of the McKamie Gas Cleaning Co. and Southern Acid and Sulphur Co., the sour gas has been brought under control.

There now comes from the field a stream of dry, sweet gas wholly free of hydrogen sulphide and fit for domestic use. This gas meets the lead acetate test which means that it has 1/10th grain of sulphur or less per 100 cu. ft. Gasoline, normal butane and isobutane are being produced. And the tremendous quantity of hydrogen sulphide removed from the gas is being transformed into solid sulphur and carted away by railroad for use in the manufacture of sulphuric acid and other industrial products.

Thus a large reserve of gas is being saved for use as fuel. And the initial step is being taken into a new field in the science of natural gas,—the recovery of free sulphur.

The McKamie Field is a small isolated dome, approximately 3200 acres in extent. Gas is found in the Smackover Lime at a depth of 9000 ft. and had an original rock pressure of over 4000 lb. The field was discovered by Atlantic Refining Co. and is now shared by Atlantic, Standard Oil Co. (through its subsidiary Carter Oil Co.) and several independents. At this time, there are 19 producing wells (with one well being drilled).

By C. W. COOPER
in collaboration with
HOWARD WADDLE

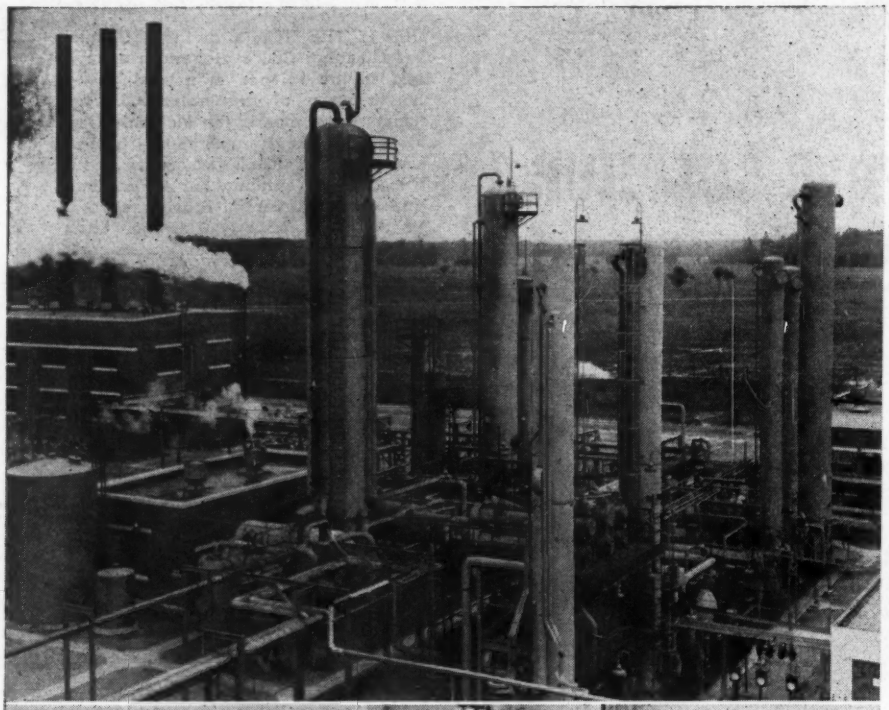
The field was drilled primarily for distillate. But distillate constitutes only part of the reservoir content and the remainder is extremely sour gas. This gas is predominately methane and ethane and is rich in propane, normal butane, isobutane and pentane. It is produced at rates of 20 to 26 million cu. ft. per day, (16.5 lb. abs. base) depending upon the production of distillate. At these rates the field is expected to last 15 years and probably longer.

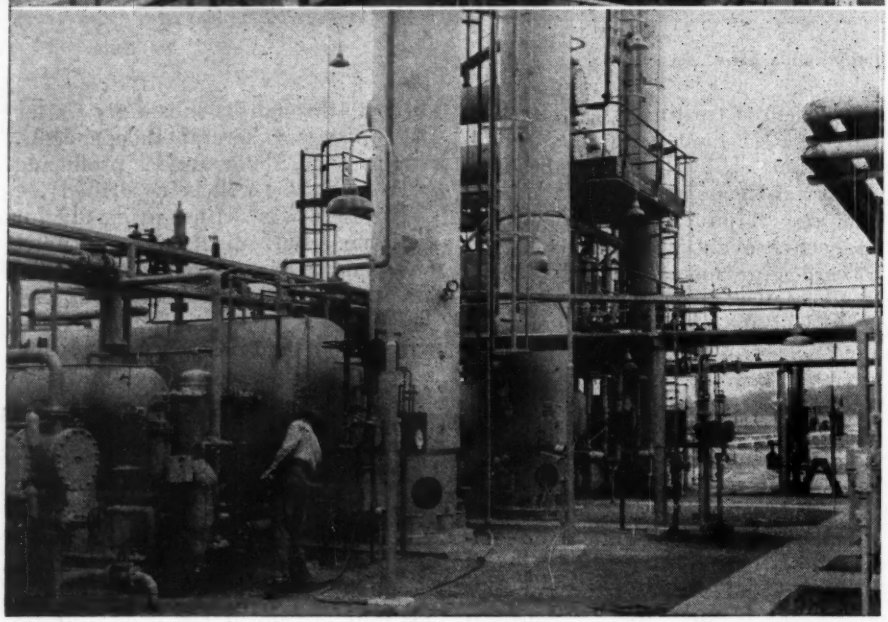
The sour gas is separated from the distillate in three streams. A high pressure stream of gas comes off the first well-head separator at 700 lb. The production in this stream is between 20 and 22 million cu. ft. of gas per day, of which 7% is hydrogen sulphide. A medium pressure stream comes off the second separator at 60 lb. The production in this stream is 2 million cu. ft. per day, of which 20% is hydrogen sulphide. Additional gas emanates from the distillate storage tanks at pressures of a few ounces. Production from this source is 1 million cu. ft. per day, of which 25% is hydrogen sulphide.

On an average, hydrogen sulphide represents 1½ million cu. ft. out of a daily sour gas production of 20 to 26 million cu. ft.

Three obstacles stood in the way of handling this McKamie gas.

1. There was no market for the





ABOVE: Desulphurization plant, left foreground; gasoline plant, center and right; boiler house left background. BELOW: Fractionation equipment from left to right, depropanizer, deisobutanizer, debutanizer.

gas, either sweet or sour, in Arkansas, yet state officials were insistent that it be used within the state. This meant that if the gas could be purified it would be sold in a cheap market at low prices.

2. No natural gas with so much hydrogen sulphide had been commercially purified. It was not known whether purification would be possible, or, if possible, whether the cost would prohibit sale at the low potential prices.

3. If the hydrogen sulphide were removed from the gas and flared, the concentration of this poison would increase its capacity for doing injury to persons and property.

But by the middle of 1941, when the flaring of gas had gone on for about a year, the McKamie Field was a nightmare to the producers. Something had to be done about it and in the fall of that year the Standard Oil Co. took the first tentative steps toward a solution.

During the latter part of 1941, a tentative market for sweet gas in Arkansas was developed.

Arkansas Power and Light Company announced its desire to install a power plant near the McKamie Field provided it could obtain a firm supply of gas for boiler fuel. This meant a load up to 10 MMcf. per day.

At the same time, Arkansas-Louisiana Gas Co. became in need of additional supplies to meet demands of several Defense Plant Corporation projects and announced its desire to take gas for the duration of the war. However, a long term outlet was needed, and Arkansas Louisiana Gas Co. agreed to take gas from the field for a long term provided it could, at its option, sell like quantities of gas in the Monroe Field to Interstate Natural Gas Co., a Standard Oil Co. subsidiary.

The prices in these two sales outlets would provide roughly a 2¢ spread over the field price. The question was whether the sour gas could be gathered, sweetened, cleaned and delivered for this amount.

Experimental Sweetening Unit

During the fall of 1941, the Girdler Corporation of Louisville, Ky., was invited to install an experimental sweetening unit in the field to determine whether the hydrogen sulphide could be removed, and for several months that company made test runs. Toward the end of the year, Girdler reached the conclusion that the hydrogen sulphide could be removed with its normal amine process.

Also during the latter part of 1941, it was determined to find out whether the tremendous quantities of hydrogen sulphide could be transformed into solid sulphur. This would eliminate a dangerous poisonous gas and might provide a valuable by-product. Accordingly, several of the leading sulphur companies were invited to experiment on the hydrogen sulphide stream being produced from the experimental Girdler plant. Two companies responded—Texas Gulf Sulphur Co. and Southern Acid and Sulphur Co. After several months of experiment, each of these companies announced that the hydrogen sulphide stream represented a commercial source of sulphur. Southern Acid and Sulphur Co. offered to purchase the entire acid stream for a long term, at a price based upon tons of sulphur produced.

When the developments had reached this stage it appeared that the sour gas might be rendered useful and the two principal producers, Standard and Atlantic, determined to build a sweetening plant.

To provide a vehicle for this, they caused the incorporation of McKamie Gas Cleaning Co.—which is owned and financed on a 50-50 basis. The

project was conceived and has been developed as a non-profit venture, which will treat all of the gas produced in the field.

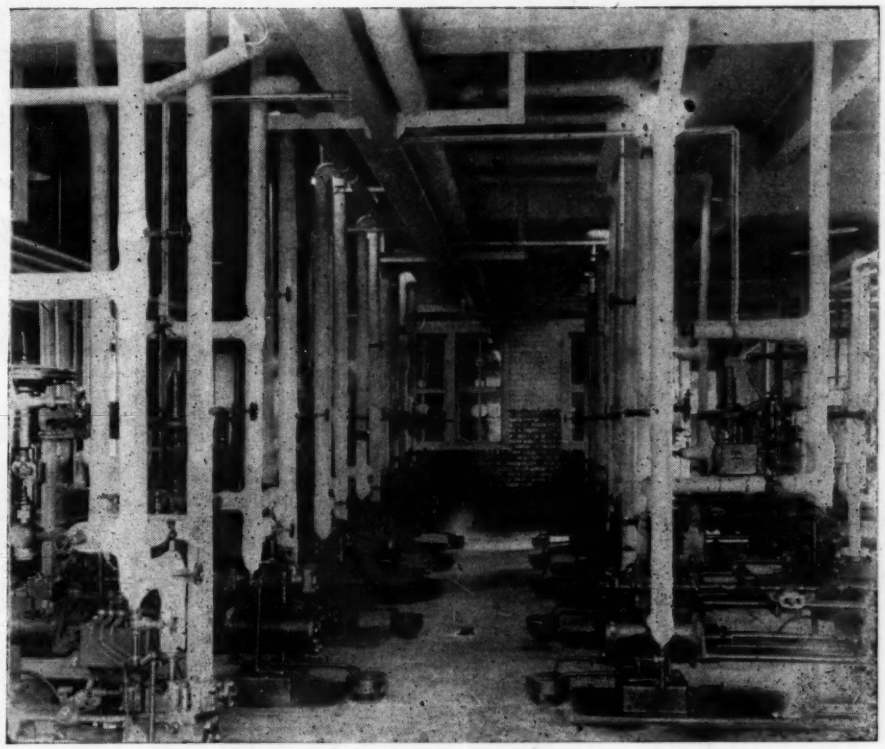
On the supply end McKamie made gas purchase contracts with all the producers operating in the field. The price is a flat amount for the sour gas at the well and varying percentages of any revenues derived from by-products. With respect to hydrogen sulphide the royalty is 3/16 of the revenue derived from the sale to Southern Acid and Sulphur Co.

On the outlet side, the McKamie Co. made contracts with Arkansas Power and Light and Arkansas-Louisiana Gas for the sale of the entire output of the treating plant, to be delivered near the plant site.

Liquefied by-products, such as normal butane, isobutane and gasoline are reserved for sale under spot contracts.

Lastly, a contract was signed for the sale to Southern Acid and Sulphur of the entire hydrogen sulphide stream which will come from the bottom of the Girdler tower.

With the outlines of the project determined by these contracts, work was begun in the summer of 1942. It was completed in March of 1944.



Interior of reflux and Products pump house.

Operating Procedure

From the plant site a gas gathering system extends out to the 19 wells in the field. The most interesting feature of this system is that it is really three parallel systems, necessitated by the fact that gas is taken at three widely different pressures at each well. These are the 700 lb., 60 lb., and tank vapor streams mentioned above.

The high pressure 700 lb. stream is gathered, treated and delivered at natural pressure, entering the treating plant at about 650 lb. The two low pressure streams are compressed at the plant to this 650 lb. intake pressure.

After the three streams are commingled, the whole stream of 26 to 30 million cu. ft. (14.7 lb. abs. base) first passes through the contact tower of the Girdler unit where all hydrogen sulphide and carbon dioxide are removed.

From the top of the Girdler unit, there emerges a stream of wet, sweet gas of 20 to 25 million cu. ft. (14.7 lb. abs. base) per day. From the bottom of the Girdler unit there comes off an acid stream of hydrogen sulphide and carbon dioxide in the amount of 3 to 4 MMcf. per day.

The wet, sweet gas at the top of the Girdler unit flows through a gasoline plant of normal design where, in successive towers, the propane, butane and gasoline are removed. From the downstream side of this gasoline plant the natural gas passes through a dehydration unit and then emerges in the amount of 18 to 23 million cu. ft. (14.7 lb. abs. base) per day, at a pressure of 600 lb.

Butane amounts to about 15,000 gal. per day and this passes through an isobutane tower to be cracked into normal butane and isobutane. Gasoline amounts to 17,000 gal. per day. These products each flow through a copper sweetening unit where any mercaptans are neutralized. The liquefied products are then pumped into spherical tanks to be held for delivery into tank cars or pipe lines.

The acid stream of hydrogen sulphide and carbon dioxide coming from the bottom of the Girdler tower is emitted at pressures of approximately 30 lb. This stream consists of 56% hydrogen sulphide and 48% carbon dioxide. If, at the moment, the sulphur plant of Southern Acid and Sulphur Co. is shut down, the acid stream is flared from a tower 200 ft. in height. Normally, however, the stream flows directly into the sulphur recovery plant.

Sulphur Recovery

In the sulphur recovery plant, the acid stream first enters a furnace where it is mixed with a limited quantity of air and is partially burned. In this way a portion of the hydrogen sulphide reacts with oxygen to form sulphur dioxide and water. From the furnace the remaining acid gas and the products of partial combustion flow through a waste heat boiler where the temperature is reduced and then into a converter where the sulphur dioxide formed in the furnace and the remaining hydrogen sulphide react to form molten sulphur. The molten sulphur is then separated off and flows into run down tanks to be measured. From the run down tanks it is pumped into a walled enclosure in which it solidifies.

Since starting on March 9, 1944, the daily produce has varied between 51.96 and 68.9 gross tons, depending upon the volumes treated. During this period, 96.7% of the hydrogen sulphide has been converted into solid sulphur.

STATISTICS AND COSTS

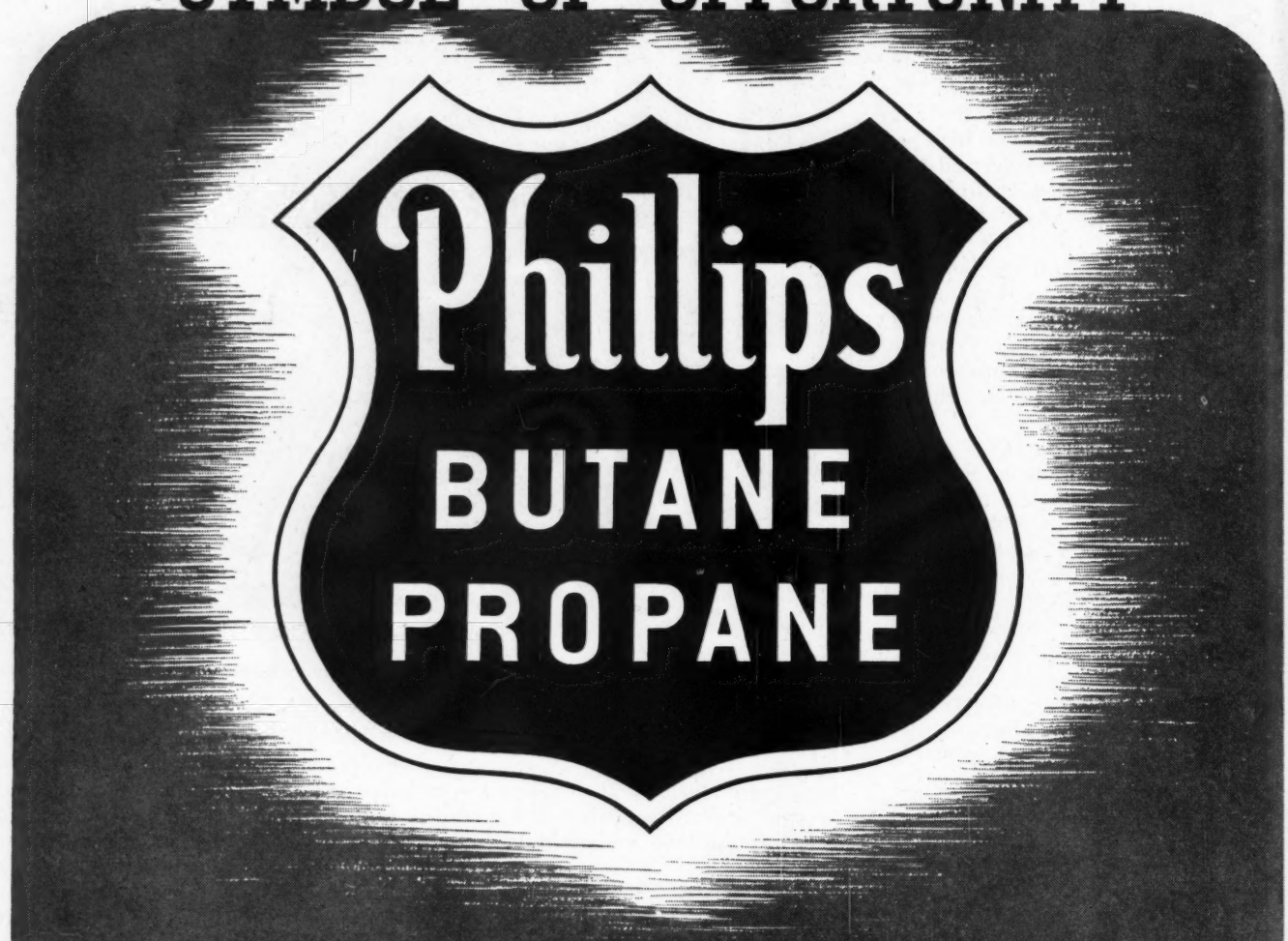
December 1944

Sour Gas Intake	728.3 million cu. ft. (16.5 lb. abs. base)
Products	
Dry Sweet Fuel Gas	610.4 million cu. ft. (15 lb. abs. base)
Normal Butane	233,065 gals.
Iso-Butane	206,200 gals.
Natural Gasoline	546,847 gals.
Sulphur	2162.7 long tons

Costs

The spread between the purchase and sales price of gas is around 2¢ per Mcf. With this differential and the money received from sale of by-products, it is expected that the plant will pay out over the life of the field.

SYMBOL OF OPPORTUNITY



The sharp increase, during recent years, in the use of Butane and Propane by utilities foretells the expanded use of these fuels for city gas plants — to replace present facilities or where no piped gas is now available. A lower cost of production as compared with manufactured gas is the answer. And the total investment — in plant and distribution system — is surprisingly low.

If this type of management-investment opportunity interests you, you are invited to contact our nearest Philgas district office and ask the Phillips engineers for more complete information.

PHILLIPS PETROLEUM COMPANY

Philgas Division

BARTLESVILLE, OKLAHOMA

Branch Offices in NEW YORK, CHICAGO, PHILADELPHIA, MILWAUKEE, DETROIT, ST. LOUIS, SHREVEPORT, AMARILLO, HIBBING, DENVER

UNACCOUNTED FOR GAS

Criteria For Determining Losses Other Than From Underground Structures

By C. H. WEBBER

Tucson Gas, Electric Light & Power Company

THE purpose of this study concerning the problem of "unaccounted-for gas" is to bring to the attention of the industry, and particularly to those concerned with actual distribution system problems, a condition which, in the writer's opinion, is deserving of serious consideration, if only for the sake of maintaining the corresponding accurate records as are required in other operations.

Certain standards of accounting, measurement, quality of gas and construction procedures are mandatory in the industry. Yet the item of "unaccounted-for gas" has been a neglected subject, other than for methods proposed concerning its detection and correction.

Definition

By the term "unaccounted-for gas" is meant that gas which is the difference between gas manufactured, produced and purchased, and the "accounted-for gas" by sales and company usage.

In its broad term it is assumed to be the gas lost through the underground distribution system, because of pipe corrosion, other material failures and faulty initial installation. Therefore, the extent of its existence is usually used as a guide in determining the physical condition of the system. It is obvious that many other losses come under the category of "unaccounted-for", yet these losses are usually disregarded, with the result that the underground structure is penalized.

Before proceeding with an analysis of these losses, it might be well to determine the approximate extent of "unaccounted-for" in the United States. Frankly, a correct determination seems impossible, primarily due to the fact that no national pressure and temperature standard exists, hence any compilation of statistics is subject to correction.

A casual spot-check of Utilities reporting, in a recent issue of Brown's Directory indicates that the national loss or "unaccounted-for" is well over 90 billion cu. ft. per year, having an estimated cost value of about $20,000,000. This includes both manufactured and natural gas, and is equal to approximately 2% of the total revenue from sales. Considering that, as far back as 1911, the estimated "unaccounted-for" in the manufactured gas industry was 11 billion cu. ft., with sales of about 1/12th of the 1941 combined, this estimate seems reasonable—with due allowance for improved construction methods.

The sum of $20,000,000 is the equivalent of 4% of $500,000,000, and 90 billion cu. ft. represents approximately 5 Mcf. per consumer for the year 1941. It is impossible, under the present method of compilation of statistics, to determine what proportion of this amount is fictitious, although it is certain that, due to the present system of reporting, such a condition exists. However, it would seem that the magnitude of these figures would warrant some consideration of the problem.

The two most common methods used for comparative purposes in stating the amount of "unaccounted-for" are expressed in percentage of gas manufactured, produced and purchased, and "loss per mile of 3-in. equivalent main." Generally, both methods express a similarity of conditions. Much has been said both for and against each method—but the authorities criticizing have failed to suggest or recommend a better one. The principle of the "loss per mile" seems logical and workable, if certain items now included were otherwise disposed of.

For ease of discussion, the problem is divided into two parts.

A SPOT CHECK has indicated that the annual loss from "unaccounted for" gas is well over 90 billion cu. ft. with an estimated cost value of $20,000,000 —or 2% of total revenues from sales of the combined natural and manufactured gas industries. Yet, this topic is a neglected one, except for methods proposed for detection and correction. In the paper herewith presented the author outlines some of the "disregarded" losses which should be considered before using "unaccounted for" as a guide in determining the condition of the distribution system. This paper was presented before the Distribution Conference of the Pacific Coast Gas Association held in Los Angeles in November of 1944.

National Pressure Standard

The *first part* considers the practicability of a National Pressure Standard, to which all gas to be accounted for, and "gas accounted-for", should be transposed. This should be made mandatory through proper legislation by the several State regulatory bodies.

From a practical standpoint, it can be assumed that a leaking pipe containing gas will show no appreciable leakage under zero gauge pressure. Hence a Standard of 60° F. and 30 in. of mercury saturated seems logical. This is supported by a Table compiled by the sub-committee on unaccounted-for gas, technical section of the American Gas Association appearing on Page 1162 of the *Proceedings* of that Association for the year 1929, and consists of a "Summary of Questionnaires (Submitted by 22 utilities) on methods of computing and comparing "unaccounted-for gas", with the sub-heading "Measurement of Gas Produced and Purchased." No reference is made to the correcting of "accounted-for."

Of the 22 utilities reporting, 10 correct to 60 and 30, and two use the same correction with allowance for saturation. The remaining 10 report as follows: 60 and 30 plus holder pressure; no correction; 60 and 30.3; 60 and 30 with no correction for variation; 60 and 30 with no correction for gas purchased; 60 and 30 plus 4 in. w.c.; 60 and atmos. press.; 60 and 4 oz. and in some cases 14.73 lbs. abs.: 60 and 4 oz. above atmos. press. at 14.4 lbs.

The correcting of gas to be accounted for to a standard base should not be difficult, as it usually involves only a limited number of meters under close supervision at all times.

As for "accounted-for gas", the problem is somewhat more complicated, in that the contracts, under which gas is sold, may include several pressure bases. This means that barometric pressure must be assumed, plus the gauge pressure at which the gas is sold, and the factors applied to each class of sales accordingly.

Selection of the proper factor for correction of metering temperature requires some assumption, and is dependent upon seasonal changes of

weather. Even though the factor is erroneous to some extent, its application will certainly result in a more tangible figure than is now generally used. As monthly reports of the Weather Bureau are available in most localities, these can be used as a base, making such corrections as actual operating conditions warrant.

Determining Losses Other Than From Underground Structures

The *second part* of the problem involves the defining and determination of such losses other than those in underground structures, and which can be considered as controllable.

These losses can be classified as follows:

1. *Inaccuracy of consumers meters.* The extent of inaccuracy is a matter of analyzing meter shop records, selecting those meters brought in for repair or other reasons, whose age represents an average of meters installed. Under an 8-year routine change program, meters removed at 4 years, would be representative. The average percentage in error, either plus or minus, should form a basis upon which to correctly estimate the accuracy of the total meters installed.

2. *Leaks adjacent to consumers, meter installations.* It is possible that a more serious condition exists in the way of minute leaks around meter and regulator settings than is usually suspected. From actual experience, it has been proven that leaks, which cannot be detected readily with soap-suds and are evidently non-existent under ordinary operating conditions, become apparent with high concentrations of odorant.

Reference is made to the Pamphlet, *Warning Agents for Fuel Gas*, Monograph 4, issued by the Bureau of Mines. On Page 144, Table 20, a leakage report for Middleton, Ohio, is compiled, showing results in the detection of leaks, using a highly odorized gas. During the test period, 1722 consumer leak complaints were reported, of which 859, or 50%, were classified as meter leaks. There is no reason to believe that conditions in Middleton differ generally from those in other parts of the country.

This being the case, it can be assumed that, of the 18 millions of consumer meter installations in operation in the industry, some 9 millions of installations are leaking to the extent that highly odorized gas will bring such leaks to the attention of the consumer.

Of course the extent of leakage cannot be accurately determined, but it can be assumed that a minimum of one cubic foot per day would be the smallest amount that could be detected by smell. Such an amount would fail to show up under routine soap-suds test. Similar conditions, nationally, would amount to 3 billion cu. ft. per year from this source. This loss is well within reason. In any event, the fact remains that the present procedure, in not determining the loss, —whatever it may be—penalizes the underground system. Methods of determination should be discussed.

3. *Overloading of consumers regulators.* Where spring-loaded regulators are installed, there is always the problem of tampering for obvious reasons, thus increasing the pressure above that specified in the contract. Every consumer complaint should warrant a routine check by the adjuster in order to correct this condition.

4. *Construction and Maintenance losses.* There is no question but what considerable gas is lost in all construction and maintenance work, due to purging and blowing. Depending upon the extent of such work, an estimate could be prepared, based upon pipe size, length and pressure, to be used in making the proper charges.

5. *Other losses.* Under this classification, any other apparent loss including loss through condensation, can be catalogued.

The determination of the foregoing classified losses are primarily dependent upon the local operating conditions. Intensity of odorization, for instance, will govern meter installation losses. If the system is high pressure, it is probable that the loss through construction and maintenance work will be greater.

Related Subjects

There are three other subjects which should be considered as relating to "unaccounted-for gas".

1. Should an increase be allowed when gas is distributed under high pressure? Due to present day improved methods of construction and maintenance, where welding of mains, services and connections guarantee a tight initial job, and when improved mechanical connections are installed, it is probable that under ordinary high pressure operating pressure, no appreciable increased losses will occur.

As has often been suggested in the past, services should be included in 3-in. equivalent mileage.

2. Due to the fact that variable weather conditions are apt to exist at the end of the calendar year, a yearly period beginning and ending at some season when weather conditions remain static for several months might eliminate discrepancies.

3. Another factor that should be considered is Specific Gravity, Assuming all corrections have been made, with due credits for controllable losses, a correction for specific gravity should be made on the remaining "unaccounted-for gas," for comparative purposes.

NEW BOOKS AND PAMPHLETS

• **Job Safety Training Manual** by Kenneth L. Faist and Stanton M. Newkirk —published by National Foremen's Institute, Inc. Deep River, Conn. This manual provides a brief, intensive training program for foremen and supervisors composed of five two-hour sessions. Simple and basic, yet it contains a practical technique for the prevention of accidents that is applicable to every type of job. The method developed is based on the training methods used by Training Within Industry programs. Job Safety Training is an application of these same principles to safety teaching. The manual has 70 instruction sheets with four supplements, price $5.00 complete.

• **The Scientific Selection of Salesmen** by J. L. Rosenstein, director of personnel Research Foundation, and vice president of the Sheldon School, Chicago, published by the McGraw-Hill Book Co., Inc. 330 W. 42nd St., New York 18. Completely covering methods which can be used in many organizations, this book shows:—How to set up job standards—How to develop the research for your company—How to fit the application blank to your specific needs—How to find the differences between very good, good, fair, and poor salesmen—How to use references advantageously—How to analyze the interview—How to discover which men are potential upgrade material.

Job Evaluation—This is the third bulletin published by Albert Ramond and Associates, Inc., Chrysler Bldg., New York 17, on the subject of Job Evaluation. This bulletin contains the following additional considerations: Present Conditions and Future Expectations; Judgment and Safeguards; Job Evaluation Committees; Simplified Procedures; Classifications and Grouping for Wage Rates; and Industry-Wide and Company-Wide Procedures. Copies of this and previous bulletins on Job Evaluation will be sent on request to the above address.

Jobs for the War Disabled—a pamphlet published and distributed by The American Veterans Association, Inc., 271 Madison Ave., New York 16. Much helpful information on this subject has also been published by the War Manpower Commission and other government agencies, covering among others the Heating, Ventilating, Air Conditioning, and Petroleum industries.

CORROSION AND PROTECTION

Of Buried Metallic Structures

Compiled and Abstracted by GUY CORFIELD, Technical Editor, GAS

Cathodic Protection on High Pressure Mains

K. B. ANDERSON, superintendent, Gas Department, Coast Counties Gas & Electric Co., Santa Cruz, Calif. Coupon data available indicates the success of this installation of cathodic protection on two high pressure gas mains. This study is a review of the effectiveness of the protection made by a comparison of the results of two tests taken over a four-year period. From a paper, "Effectiveness of Cathodic Protection on 10-in. and 6-in. High Pressure Gas Mains," first presented before the Pacific Coast Gas Association.

THE intent of this study is to review the effectiveness of cathodic protection used on a 10-in. and a 6-in. gas main over a period of four years by comparing the results of two tests. The first test was made in 1937 to determine the amount of compensating current necessary to give complete cathodic protection to these mains. The second test was made in 1941 to determine the effectiveness of this protection. An analysis of available leak records and available coupon data is included.

Description of Lines: The 10-in. main was laid in 1929. It is 10.34 in. I. D. steel pipe, has a wall thickness of .205 in., weighs 22.87 lbs. per ft. and was treated with single wrap tar and felt paper.

The 6-in. main was laid in 1930. It is 6.25 in. I. D. steel pipe, has a wall thickness of .203 in., weighs 13.923 lbs. per ft. and was treated with single wrap tar and felt paper.

Soil: The soil in this region is principally Dublin Clay Adobe. The topsoil, 12 to 30 in., is dark gray or black heavy clay with an adobe structure. The upper portion of the subsoil is light brownish-gray or yellowish-brown material of variable texture. It contains a high percentage of lime. The lower portion of the subsoil is composed of variable layers which range in texture from clay to fine sandy loam and in color from grayish brown to yellowish brown, and are more or less calcareous. The land is generally flat and contains injurious quantities of alkali, where drainage is deficient. The line locations, topography and soil data are shown in Fig. 1.

The purpose of the first test in 1937 was to determine the amount of compensating current necessary to give complete cathodic protection to the 10-in and 6-in. transmission mains. Between the P. G. & E. meter station and a point one-half mile west of Bolsa Road, a distance of about 4 miles, the 10-in. main parallels a drainage canal, and much of the pipe in this section is in permanently wet soil. A large number of leaks had already occurred east of Frazer Lake Road and in the vicinity of Bolsa Road. The pipe wrapping in this section was in very poor condition.

Temporary ground rods were driven into the canal at Frazer Lake Road and connected to the positive terminal of a storage battery, the negative terminal of which was connected to the gas main. Pipe to soil current measurement were made with a McCollum earth current meter at each test location. The value of current flowing along the pipe was obtained by measuring the potential drop over 500 ft. sections of pipe. Knowing the resistance of the pipe, the current in the pipe can be calculated. Soil to pipe currents and pipe line currents for various values of battery current are shown on Fig. 2. Due to the very low soil resistance, only 4 volts were required for a 24 amp. drain at Frazer Lake Road. A much greater battery voltage was required at Bolsa Road due to the dryness of the soil there.

It will be observed from Fig. 2 that a large portion of the current drain at Frazer Lake Road was from the main east of the 6-in. tap. For the same total current drain the pipe west of the 6-in. tap was getting less protection than the other sections.

By insulating a flange of the 10-in. valve at Frazer Lake Road, the gas mains were divided into three sections, electrically, as the 6-in. tap was already insulated from the 10-in. main. A study of Fig. 2 indicates that a proper current drain from the three sections of gas main at Frazer Lake Road would be as follows:

10 in main east—10 amp.
10 in. main west—10 amp.
6 in. main north— 5 amp.

At Bolsa Road a proper current drain for maximum protection would be as follows:

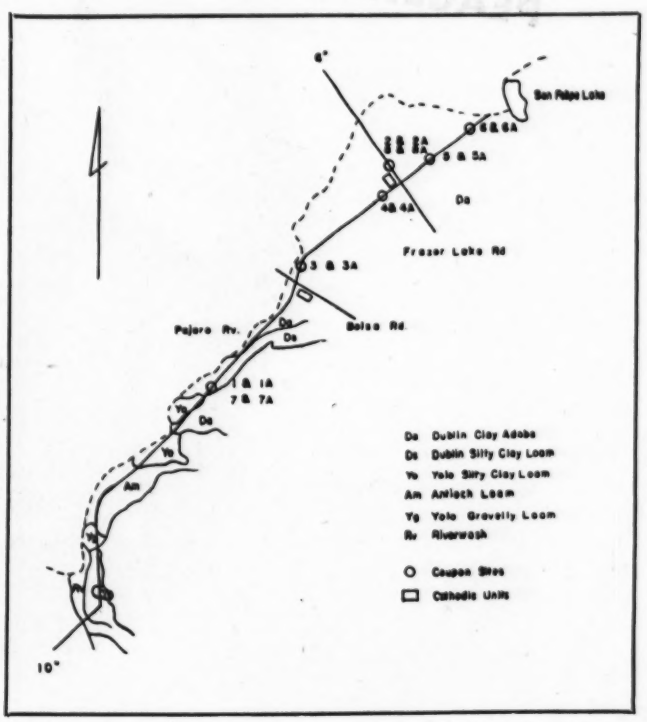


FIG. 1.

Soil map of 10-in. and 6-in. gas transmission mains near Gilroy, Calif.

WAR ECONOMY
CONTINUED PRICE CONTROL
LIMITED RECONVERSION
WAGES AND TAXES
WARTIME RESTRICTIONS
PEACETIME ECONOMY

ompanies can meet

ritical "in between" period

. . . with sound sales planning

INDUSTRY has taken its first step toward the production of consumer goods, with the limited reconversion announced since victory in Europe. But full return to peacetime economy will come gradually.

The war is still on . . .

A large part of our European army must go to the Pacific

Food will be scarcer, transportation tighter

Government restrictions will still hold to restrain inflation

This in-between period will bring many new problems. It can be a critical time for the Gas Industry. Though production of gas appliances is beginning, government control over prices will not be relaxed. Wages and taxes may increase. But the pre-war pattern of distribution can prevail.

Never will selling be more important than in the months ahead. The Gas Industry must develop new techniques in sales and distribution to meet the challenge of this period of reconversion. Pre-war selling procedures must be carefully examined in all their phases—including direct selling, advertising, sales promotion, and public relations, as well as relations with cooperating allied dealers for supplemental distribution of gas appliances.

Servel has already taken the first action toward return to peacetime economy. With the cooperation of the Sales Training Division of the American Gas Association, it has developed the Servel Salesman Selection Program. Through this program, sales managers have been receiving practical instruction in how to select the best candidates for training and employment on their strengthened sales force.

Other important programs will follow this one. Their aim will be to help the Gas Industry meet the years ahead with the most efficient selling techniques possible.

SERVEL, Inc. EVANSVILLE 20, IND.

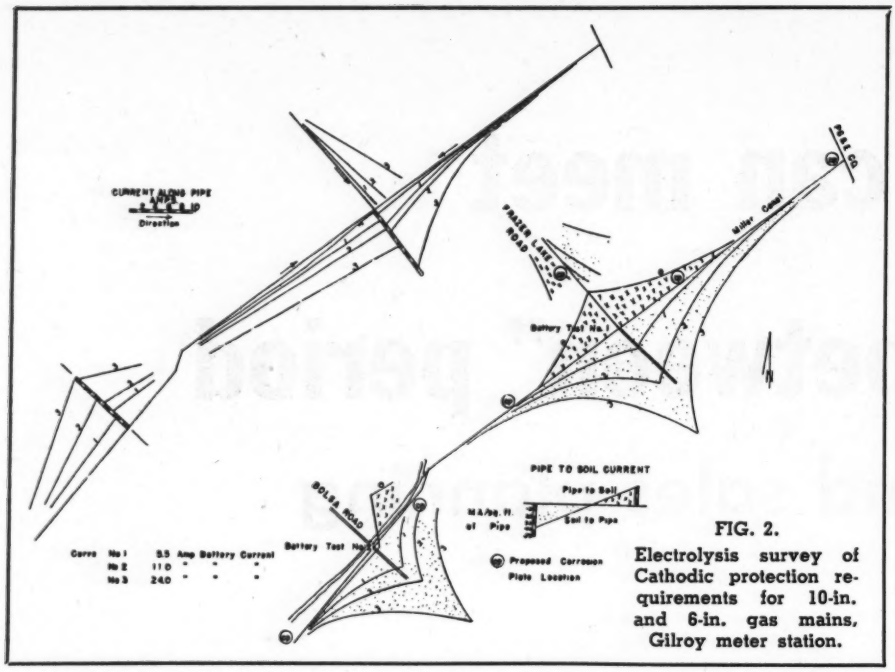


FIG. 2.
Electrolysis survey of Cathodic protection requirements for 10-in. and 6-in. gas mains, Gilroy meter station.

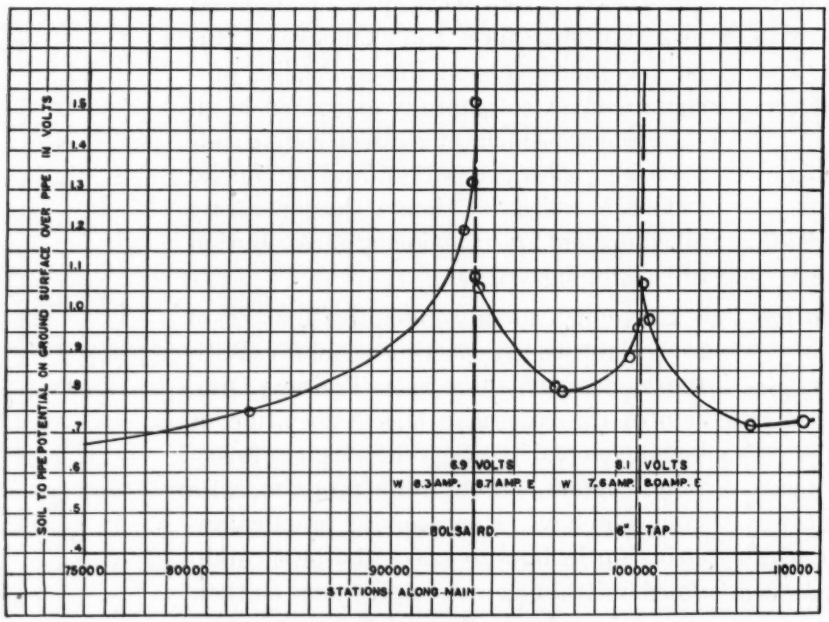


FIG. 3. Soil to pipe potential on 10-in. main.

10 in. main east— 5 amp.
10 in. main west—10 amp.

The cathodic corrosion eliminators were recommended for the protection of the 10-in. and 6-in. gas mains, as follows:

Frazer Lake Road—One 35 amp., 8 volt, type CBM, 110/220 volt A.C. Pilot pipe 5250 lbs. of cast iron.

Bolsa Road—One 20 amp., 8 volt, type CBM, 110/220 volt A.C. Pilot pipe 3000 lbs. of cast iron.

The pilot pipes for both installations were installed in the canal so as to be in continually wet soil. It was recommended that a flange of the 10-in. valves at each location be insulated. Six pairs of corrosion coupons were recommended to be installed at locations shown on the soil map of the region. (Fig. 1.)

Second Test

The second test was made in 1941 to determine the effectiveness of this protection and operation and adequacy of the equipment. Tests were made from the San Benito River to the P. G. & E. meter station.

Soil resistance was determined by Shepard rod readings. This was found to vary from 490 ohm.—centimeters at pipe depth in wet soil to 1200 at the surface in Dublin Clay Adobe. Long line currents were found by measuring the potential drop over known lengths of pipe and calculating the value of current flow. Soil to pipe potentials were found by using a copper sulfate electrode and a potentiometer-voltmeter. The results of these tests are shown in Fig. 3.

As a result of the second test, it was recommended that the pilot pipe, or anode, be increased at the Frazer Lake Road unit. It appeared to be advisable to increase the current drainage at this point by this method to afford more protection to the mains.

No leak records prior to 1937 are available, but the operating department indicates that the number of leaks in these mains in this area have decreased considerably since the units were put in operation. In fact, practically all leaks discovered since 1937 appear to be a result of pipe damage before that date rather than since the corrosion eliminators were installed.

Results of coupons installed as test specimens are shown in Table 1.

Although no statistics other than coupon data are available to indicate the effectiveness of this protection, it appears reasonable from a study of Fig. 3 that the original installation was and is operating satisfactorily. The available coupon data and operating records support this conclusion.

TABLE 1. COUPON RESULTS

No.	*Wired to Pipe*	*Date Installed*	*Weight at Installation Troy oz.*	*Date Removed*	*Weight at Removal Troy oz.*	*Loss of Weight Troy oz.*
			Before Cathodic Protection			
1	Yes	11-15-35	10.17	12-27-37	9.12	1.05
1A	No	"	9.75	"	9:75	—
2	Yes	"	10.74	"	5.54	5.20
2A	No	"	9.87	"	9.65	.22
			After Cathodic Protection			
3	Yes	12-23-37	10.98	5-39	10.96	.02
3A	No	"	13.03	"	12.82	.21
4	Yes	12-14-37	12.76	"	12.75	.01
4A	No	"	12.45	"	11.94	.51
5	Yes	12-13-37	12.72	"	12.71	.01
5A	No	"	11.75	"	11.63	.12
6	Yes	"	12.98	"	12.98	.00
6A	No	"	12.41	"	12.10	.31
7	Yes	12-27-37	12.44	"	12.43	.01
7A	No	"	12.96	"	—	—
8	Yes	12-13-37	12.41	"	12.44	.03
8A	No	"	11.93	"	11.91	.02

SALES SLANTS

SALES TRAINING

Some Suggestions for Making It a Continuous Process

SALES training should start the day the new salesman comes to work and should continue as long as he is with the company, so states Edward J. Hegarty, Westinghouse Electric and Manufacturing Co., Mansfield, Ohio, in an article published in a recent issue of "Printers' Ink."

A salesman should get good, then better, and then should continue to get better. If selling is a profession, training will naturally be a continuous process. The better doctor goes back to school, the teacher spends his summers in school getting credits which apply against a higher degree. The accountant is never quite satisfied until he gets his C.P.A. rating, the insurance man studies until he becomes a CLU, the graduate engineer does special work for his higher degree.

The following points on sales training abstracted from Mr. Hegarty's article, should make good reading in these days when the gas industry is looking forward to the return of sales activities.

1. When the salesman first comes to work, explain plans for his continuous training. Explain why it is to his interest to be a good salesman and why, in order to be a good salesman, he needs continuous training.

2. The salesman should be constantly shown why it is to his advantage to get good, and then to get better. List the reasons why, and cover each in the training plan.

3. If possible, it might be well to provide each man with a check chart to show him what training he is to get and when that training should come in his career.

4. If possible, make up a schedule of regular periods of work with the field trainer or a sales supervisor.

5. If your training program is one of training distributor or dealer salesman, make up a schedule of what training you feel these men need during any year, and get the agreement of distributor and dealer management on giving that amount of training.

6. Build your plan to include everybody—salesmen, field supervisors and home office personnel. Keep selling the idea that no man is fully trained.

7. Develop your training program in your own thinking, and in your own scheduling in successive steps. These might be: (a) initial training, (b) intermediate training, (c) advanced stages of training.

8. Appropriate recognition might be given on completion of each portion of the sales training program. This might involve a diploma, or other such device. The salesman should have a feeling that he is making progress and he should know that the progress he is making is recognized by his boss.

9. Use such devices as correspondence courses or regular mailing to keep your training continuous. Watch the load of such activities. Don't pour it on too heavy. Mail discussions with the salesmen can help in this.

10. Use the "swap ideas" theme for meetings.

Continuous training keeps men sold on their jobs. It helps keep new ideas flowing. Make the plan continuous. Sell the idea to both management and salesmen, "When you stop getting better, you stop being good."

DEALER COOPERATION

Oklahoma Utilities and Dealers Lay Plans to Select and Train 500 Specialty Retail Salesmen

SPECIAL methods for selecting and training gas merchandising salesmen for Oklahoma were outlined during recent Servel Training clinics held in Oklahoma City, Tulsa, Enid, Ardmore and Muskogee, starting May 3 and ending May 22.

Representatives of Oklahoma Natural Gas Co., Consolidated Gas Utilities Corp., Northern Oklahoma Gas Co., and Public Service Company of Oklahoma attended the meetings and discussed plans whereby they will cooperate with distributors and dealers in gas equipment and merchandise, in selection and training of competent sales people.

Because of a law enacted in 1935 by the Oklahoma Legislature, public utility companies there cannot sell appliances and equipment as they can in most other states. Such merchandise is sold entirely in Oklahoma by such distributing firms as Hales-Mullally, Inc., of Oklahoma City, statewide distributors of natural gas and liquefied petroleum gas appliances and equipment, through local dealers.

Harry Canup, sales manager of the Hales-Mullally firm, attended all the meetings and explained the merchandising situation in Oklahoma to dealers, most of whom were local hardware or furniture merchants, who handled other lines as well as gas appliances.

Natural gas company representatives who attended offered full cooperation in training sales people selected by local dealers in efficient presentation of advantages of utilizing natural gas for cooking, heating and other purposes. The gas companies also offered to assist in planning advertising campaigns and by offering display space for appliances in gas company offices where desired by local dealers. Directing the cooperative campaign of the gas utilities will be Hal North, advertising and sales promotion manager of the Oklahoma Natural Gas Co., Tulsa, Okla.

Discussing the sales situation in Oklahoma, Mr. Canup said:

"During 1941 there were in Oklahoma approximately 300 retail gas merchandising salesmen handling appliances and equipment sold by our local dealers. Now there probably are not more than 25. We believe that the trickle of merchandise which will follow partial reconversion will rapidly develop into a flood as restrictions are further loosened and that at least 500 specialty retail salesmen will be required to handle gas appliances and equipment alone. Hence the need for active planning now for selection and training of sales people who will produce results."

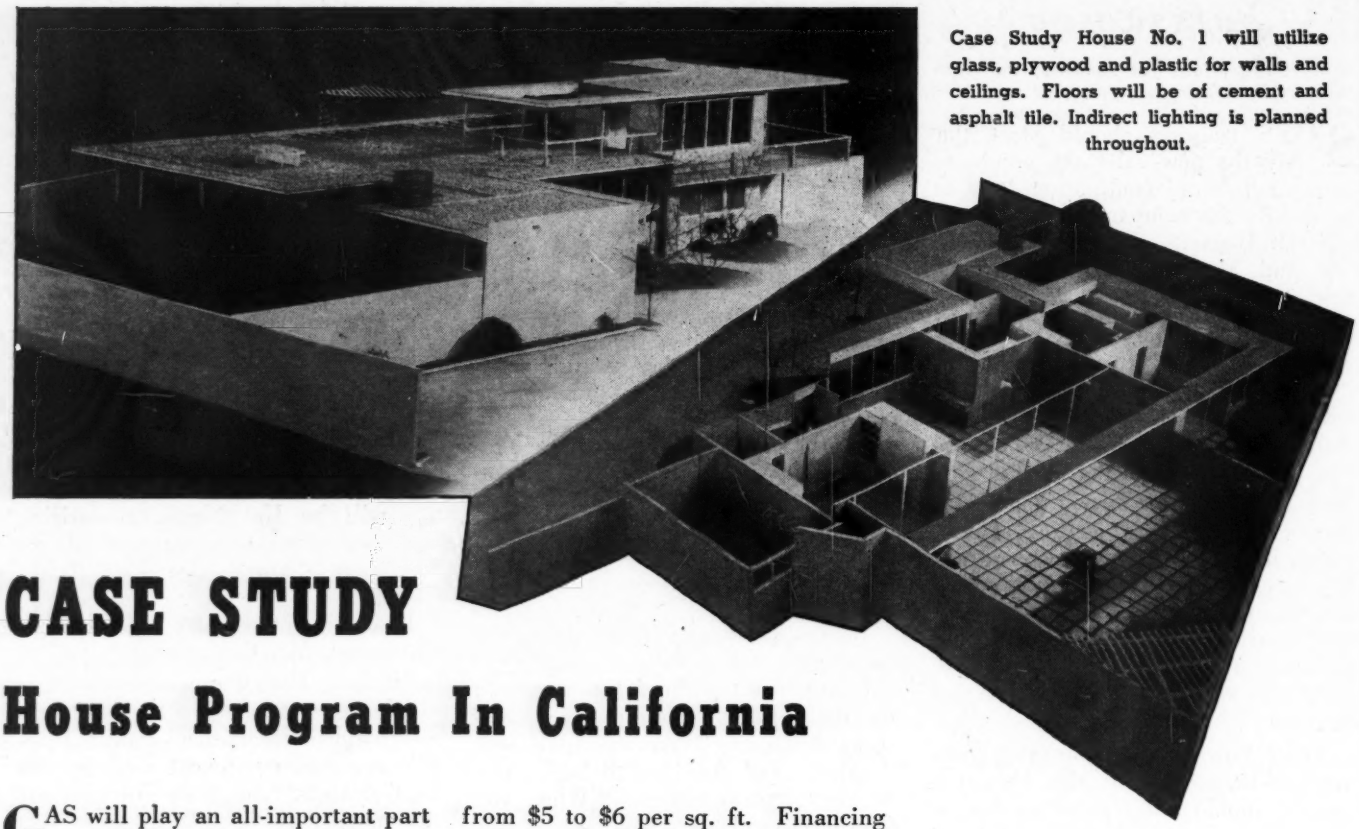
MOTION PICTURE

Pacific Coast Gas Association Appropriates Fund for Gas Orientation Film

The directors of the Pacific Coast Gas Association have appropriated $10,000 for the preparation of a motion picture useful in painting a general background of the gas industry to both employee and customer audiences.

Work will be done by a special committee composed of R. R. Gros, Pacific Gas and Electric Co., chairman; R. G. Barnett, Portland Gas & Coke Co., and W. M. Jacobs, Southern California Gas Co.

The motion picture was originally planned as a part of the Association's salesmans' training course started in 1940 in cooperation with the California State Department of Education. This training course, consisting of 14 pamphlets, has since been made available to the American Gas Association, which is currently engaged in developing a national training program for gas utility salesmen.



Case Study House No. 1 will utilize glass, plywood and plastic for walls and ceilings. Floors will be of cement and asphalt tile. Indirect lighting is planned throughout.

CASE STUDY

House Program In California

GAS will play an all-important part in the 13 model houses which are now being planned by eight nationally known architects and designers for immediate postwar building in the Case Study House Program of the magazine *Arts & Architecture*, published in Los Angeles. Seven of the 13 houses will use gas for cooking, water heating, space heating, and refrigeration, the remaining six will use gas for cooking, water heating and space heating, the refrigeration not having been selected at this date.

The houses will all be constructed by Ray A. Myers of Myers Brothers, to whom the magazine has let the general contract, in the Los Angeles area. Following completion, they will be opened simultaneously for public inspection for an eight-week period. At that time the Los Angeles Gas Companies will take appropriate steps to direct the public to these gas serviced homes.

Purpose of the Case Study House Program is to reduce the opinions, speculation and talk about the "Postwar House" to some semblance of a practical basis of what the public can actually expect in a "house—postwar." The study, planning, actual design of the houses has already begun, and Case Study Houses Nos. 1 and 2 are described in the February, March, April and May issues of *Arts & Architecture*.

The houses will average about 2000 sq. ft. each and are expected to cost from $5 to $6 per sq. ft. Financing has been arranged through several different large Los Angeles loaning institutions. One contract will be written covering house, appliances, and furniture. Through a system of loan bookkeeping the house will be amortized in 20 years, the appliances in 8, the furniture in 5.

The following architects and designers have accepted commissions in cooperation with *Arts & Architecture's* Case Study House Program: J. R. Davidson, Sumner Spaulding, Richard J. Neutra, Eero Saarinen, William W. Wurster, Charles Eames, Ralph Rapson, and Theodore Bernardi.

Case Study House No. 1

The Problem: To design a house for a family consisting of a man and wife, both of them professional people with mutual interests, one teen-age daughter away at school, and a mother-in-law who is an occasional guest. J. R. Davidson is the designer.

Design and Facilities: Case Study House No. 1 will be a two-story structure. Downstairs will be a large combination living-dining room, two bedrooms, two baths, the kitchen, and appropriate closets, storage space, and service areas. Upstairs there will be a small hall, a guest room, and bath.

Gas-Fired Appliances: The house will be furnished with a Western-Holly C-P gas range; a 30-gal. A. O. Smith Permaglas water heater, and an 8 cu. ft. Servel refrigerator. The heating system will be a gas-fired hot water radiation system. The Maid's room will be heated by a Day & Night Manufacturing Co. Panelray heater.

Heating Facilities: A radiant floor-type heating system is proposed because this system almost eliminates stratification of heated air in the upper part of the room. Excessive air movements, adherent in forced air systems, are also avoided. A thermostatically controlled gas-fired heater provides hot water which is circulated by a pump into pipes laid on a gravel bed underneath the concrete floor slab. (A further protection against heat escaping into the ground could be hollow masonry block or foamglas insulation with the heating coils embedded in the slab above.) This slab will be colored, can be covered partially by rugs, carpeted entirely, cellular oak blocks may be laid in mastic, or asphalt tile may be used.

Case Study House No. 2

The Problem: To design a house of approximately 2000 sq. ft., for a family of four, consisting of a mother, father and two young children. Sumner Spaulding is the architect.

Design and Facilities: The house will be a one-story structure, consist-

... for POWER and HEATING UNITS

There are Webster Burners and Controls for every type of boiler and all gas pressures, that will produce maximum combustion efficiency at lowest operating cost within their range and size. The variety of standard types and sizes of Webster Burners provides all the advantages of specially engineered equipment at low installation cost.

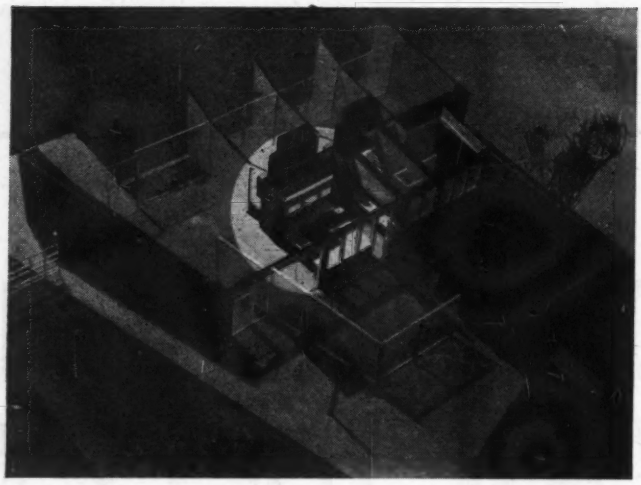
There are no re-conversion problems to be overcome at Webster, to resume manufacture of burners and controls for non-military installations.

Delivery is entirely dependent on availability of materials and your priority.

Represented by:

FEDERAL SUPPLY CO.....Oklahoma City, Okla.
CATLETT ENGINEERS.....Dallas, Texas
F. J. EVANS ENGINEERING CO.....Birmingham, Ala.
F. P. FISCHER ENGINEERING CO.....New Orleans, La.
F. J. EVANS ENGINEERING CO.....Houston, Texas
E. G. LANGHAMMER CO.....San Antonio, Texas
SNOOK & ADERTON.....Amarillo, Texas
NATURAL GAS EQUIPMENT CO.
.....Los Angeles and San Francisco
ALL SURFACE COMBUSTION OFFICES

THE WEBSTER ENGINEERING COMPANY . . TULSA, OKLA.
Division of SURFACE COMBUSTION . . . . . Toledo, Ohio



Case Study House No. 2 will have interior and exterior plywood walls and a floor of hard-surfaced material. Features sliding glass partitions between indoor and outdoor areas. Circle shows kitchen convenient to both indoor and outdoor dining areas.

ing of a living-dining room, three bedrooms, two baths, the kitchen, a dining patio, closets, and storage space.

The Kitchen Utility Area is designed to accommodate all cooking and dish-washing appliances along two walls. The third wall is used for laundry equipment — washing machine, gas-fired clothes dryer, ironer, ironing board, sewing machine, and storage space for clothing. When not in use, a folding partition covers the equipment. The space above this is arranged for storage of pots and pans, staples, and canned goods, etc. The fourth wall opens directly into the living room and contains a completely equipped buffet. The kitchen can be entirely separated from the living area by a folding wall. However, this will not always be necessary, inasmuch as it is easier for the mother to supervise family activities when the kitchen is open.

General Data on Gas Appliances

Ranges: In the 13 case study houses gas ranges manufactured by the following will be installed: Western Stove Co., Inc. (Western-Holly); Geo. D. Roper Corp.; American Stove Co. (Magic Chef); Tappan Stove Co.; O'Keeke & Merritt Co.; Cribben & Sexton; Gaffers & Satler; and James Graham Mfg. Co. (Wedgewood).

Water Heaters used will be manufactured by: A. O. Smith Corp.; General Water Heater Corp.; United States Heater Co.; Hoyt Water Heater Co.; Mission Water Heater Co.; and Continental Water Heater Co.

Heating Equipment: Heating systems used will be those manufactured by: A. M. Byers Co.; Ric-Wil Co.; Cleveland; Coleman Lamp and Stove Co.; Hamel Radiator Co.; Day & Night Manufacturing Co.; Ward Heater Co.; Payne Furnace Co., and Hayes Furnace Co.

Refrigeration: Servel.

Home Service Training Pattern

THE following "Pattern for Training Home Service Representatives" has been formulated and presented before a Pacific Coast Gas Association meeting by R. C. Terradell, supervisor of sales training, Southern California Gas Co., Los Angeles:

(1) First step for laying out a training program includes a detailed outline of the work duties of Home Service. This would probably include such items as cooking foods by actually applying the recommended cooking methods; disseminating information on nutrition principles, conducting public demonstrations using the processes. Full instruction should be given on home service calls to include problems which might arise. Ample time should be taken to instruct members in making out the right reports for the job done.

(2) Telephone technique should be one of the problems answered.

(3) A thorough knowledge of the policies and practices of the company with an explanation of the utilization of gas should be an accepted part of the training course. If it is within company policy, the girl will learn to make minor adjustments on range top oven burners and pilots.

(4) The training pattern should take no small detail for granted. How to use maps and drive an automobile are just as important as knowing how to dress appropriately for the work.

(5) Visual, audio and all available training aids should be written up and made available for a competent instructor. Classroom facilities include model kitchen, screen, blackboard and study area.

(6) Carefully designed curriculum would follow material necessary for future assignments. Each student should be given a chance to present a demonstration just as she would for a regular audience.

(7) A grading system should be kept for office reference so the supervisor would have some guide to assist her in placing the girls.

(8) Modification, additions and deletions can be made after the plan is put into effect. The whole purpose is to provide a pattern for training, designed to qualify candidates in the shortest period of time at the least expense.

Servel Air-Conditioning Unit Displayed In Seattle

At two recent meetings, held in the home service auditorium of the Seattle Gas Co., John K. Knighton, sales manager of the Air-Conditioning division of Servel, introduced the Servel Year-Round gas air-conditioning unit to the building fraternity of Seattle.

Forty-four members of the Washington State Chapter of the American Institute of Architects, and members of the American Society of Heating and Ventilating Engineers were entertained at a luncheon meeting, and 51 members of the Seattle Master Builders, and of the Banking fraternity were guests at a dinner meeting.

Preceding Knighton's discussion of the unit, N. Henry Gellert, president of Seattle Gas Co., delivered a short address on the "Progressive Gas Industry."

Following each meeting, the guests were invited to examine the display of the unit.

Hardwick Stove Offers Merchandising Helps

The New Freedom Gas Kitchen promotion is being extensively publicized by Hardwick Stove Company in a merchandizing program launched recently. The company has built a modern kitchen, known as "Stepsaver Design of the New Freedom Gas Kitchen," and has shown it to dealers at the Chicago Furniture Mart in the company's display space.

This modern kitchen is the key point of the merchandising helps now being made available by Hardwick. The company has received a ready response from utility companies and dealers to its offer of a free advertising service. The service includes mats of six attractive newspaper advertisements in various sizes, four-color counter and window display cards, and four-color envelope stuffers and display room literature.

POST-WAR NOTES and NOTIONS

By STANLEY JENKS

Polls

With all due respect to Dr. Gallup, our contemporary Fortune, and other professional public opinion tasters, I am growing more skeptical every day about the merits of these "How do you plan to blow your dough?" polls that propose with crystal ball clarity to guide our post-war merchandising activities.

One such poll of urban families states categorically that two-thirds (specifically, 67.3%) of all urban American families are planning to buy home appliances when, if, and as available. And, furthermore, those quizzed know exactly how much they are willing to pay for them. To illustrate, 21.5% of them are going to buy cooking ranges and are willing to pay $155 per each. And 25.5% plan to buy refrigerators at an average price of $196. Or so they say.

In the air-conditioning field, 29.3% say they expect to buy some kind of mechanical air-conditioning. The majority of these people (81.1%) want a central system, 17.0% an individual room cooler, and the rest are undecided. But—such is wishful thinking superimposed on the deluge of post-war publicity with which we have unfortunately been beset—these central air-conditioning "prospects" have a price limit on the job of a little better than $250.

So you can see how easy it is to be quite skeptical about the merits of these polls that make no realistic attempt to get down to fundamentals.

Reducing Gas Costs

The British, who have government-sponsored electrical competition no less than ours, are, like the A.G.A., wasting no time in reviewing their manufactured gas production costs. There is no natural gas, of course, in Great Britain, but an excellent supply of bituminous coal, which in the conservation of natural resources, automatically puts the British gas industry into the coke and chemical by-products industries too. Probably just as anxious as we are to find cheaper ways of making gas, their executives, however, are certain that a substantial part of the answer lies in a better use of their present facilities.

Taking, for example, the plant load factor, which is the ratio of the average make of the plant over a 12 months' period on a 24-hour-day basis to the capacity of the plant over the same period, the Gas Light & Coke Co., the world's largest operating manufactured gas company, has found by analysis that, beginning with a plant load factor of 52%, an increase of 25% would lower their gas manufacturing cost 10%. Reducing the plant load factor by 25% increases the gas manufacturing cost 20-30%.

Plant load factor is, therefore, primarily a sales promotional problem. It demands a thorough study by each manufactured gas company of the effects of various loads, and, as a starter, there is no better textbook available than Report No. 4 of the A.G.A. Post-war Planning Committee.

Price Controls

There are few who question the need for price control through the critical years until the $116 billions of wartime savings have been validated by what Chester Bowles of OPA has called "an avalanche of civilian goods and services."

There are many, however, who are definitely opposed to the cockeyed way OPA is going about the job. And I am not thinking primarily about butter going bad on the grocer's shelves through lack of red points to buy it.

I have in mind the serious inflationary threat created by the shortage of civilian goods, and which is primarily due in several fields to the inability of manufacturers with idle capacity to produce and market these products at a profit under price ceilings frozen as far back as 1941 in some instances.

As civilians, none of us have begrudged the all-out war production which won the European war, and will win the Nip war, too. It was perfectly proper to make civilian less profitable than war production. And Uncle Sam with increased normal, surtax, and excess profits income taxes, plus diligent renegotiation, has done a very effective job in braking war goods prices. Since profittable operation is the life blood of American industry, industry needs some profitable operations in civilian fields now, while war contracts are being cancelled.

We glibly talk of 60 million post-war jobs, at least half of them to be provided by industry. How can industry, especially the smaller manufacturers, who will be expected to carry most of the load, be expected to provide any jobs at all, when under present OPA practices, it will be less costly to lock the doors of the plant and not make anything, rather than lose its shirt in this "avalanche of civilian goods and services" which Mr. Bowles admits must be forthcoming?

No industry in the whole set-up is more disastrously susceptible to inflation than the utility industry. No industry is more dependent on jobs for its customers. Therefore, in self-defense if nothing else, the utility industry should add its considerable weight to those who feel that Congress must review the Price Control Act and make OPA the instrument to control prices—not profits. As any discerning citizen can see, there's a world of difference. Unfortunately, some of the Bowles boys need a haircut. There's something obstructing their view.

Keep price control by all means until every last Nip enemy is dead or dunked, but in the name of all that's commonsensical, give industry the incentive to make the jobs that create the production that will absorb the potentially inflationary money available.

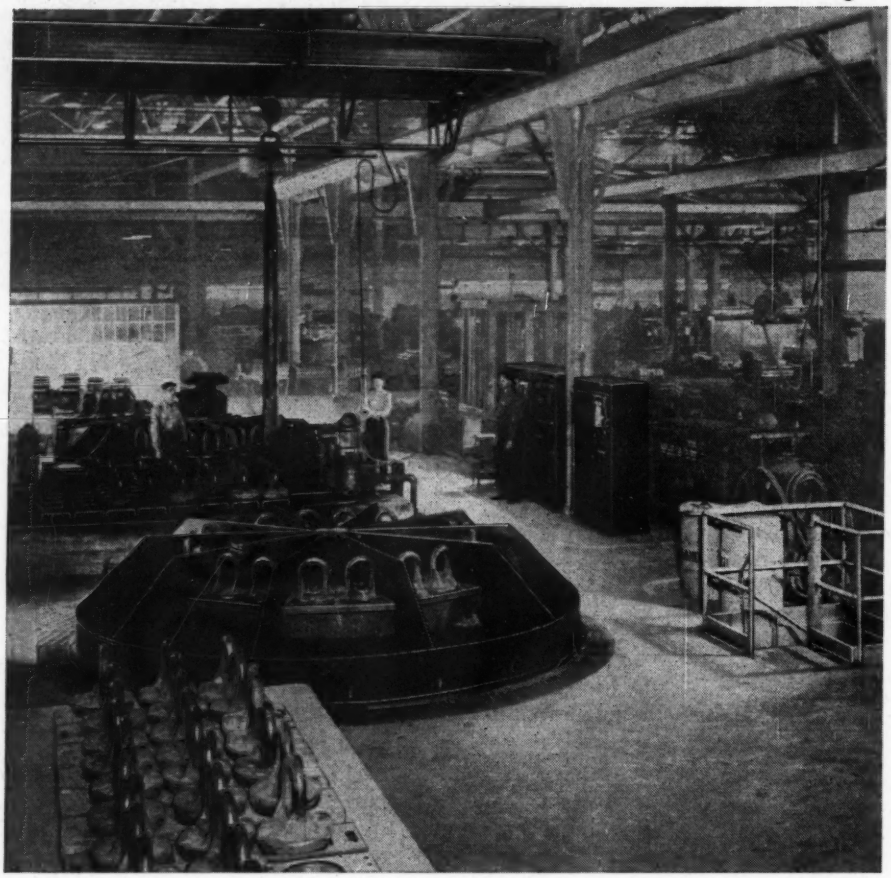


FIG. 1. General arrangement of the furnaces and other equipment. Panel board is shown at the right.

Vertical Gas Furnaces for Heat Treating

IN many instances, factory equipment originally installed for defense work may be easily applied to peacetime work. A typical case—at National Supply Co.'s plant in Torrance, California—is herein exemplified.

Wartime activities of National Supply's Torrance plant include the manufacture of ship shaftings, rudder stocks, army tank castings, airplane landing gears, gun tubes, breech blocks, alloy steels and so on. Peacetime activities are devoted chiefly to the manufacture of machinery for drilling and producing oil wells; however, a considerable volume of special electric steel is made in peacetime for the use of other manufacturers.

National Supply has extensive facilities for heat treating which are under the supervision and direction of their modern metallurgical department.

In order to heat-treat gun tubes for the war program, National installed two large pit-type vertical furnaces—designed by Surface Combustion—which are probably the only ones on the Pacific Coast with rotating tops. Now that their gun project is completed, the company is finding it advantageous to use these furnaces for heat-treating, shafting and other oilfield equipment. The advantage found in the new application of these furnaces lies chiefly in the compact layout of the pits and tanks, the ease and speed of handling the work, and the convenient facilities for controlling the various operations.

Building limitations necessitated excavating a deep cellar, or basement, and setting the heat-treating furnaces therein. The furnace tops are just above the floor level and this greatly facilitates handling the work. (See Fig. 1). The furnaces are easily accessible for operating adjustments.

The furnaces have a working zone 11 ft. in diameter and are 12 ft. in depth, ventilation being through the bottom to an outside flue. Each top has a carrying capacity of 15,000 lbs. and turns at the rate of one revolution in 4 minutes on equally spaced roller assemblies, one of which is the driver. To prevent loss of heat, sand seals are employed under the furnace tops.

There are 30 10-in. diameter openings in each rotating roof, and the work is suspended through the openings on bail-type holders as shown in the illustrations. This method of holding shafts in a vertical position is very desirable, since it also eliminates the warpage from handling that is usually encountered when picking up shafts at a high heat from a horizontal position for quenching. The holders are seated on the roof in sand seals to retain the heat.

The high-heat furnace has a total of 40 burners which are arranged tangentially around the pit and are connected and controlled in four separate groups.

The draw furnace is of the recirculating type and is equipped with a series of baffles in the hot-air duct to direct the flow and secure uniformity of heating. The baffles are adjustable from the working floor by means of a series of levers, and selective heating can be obtained as desired. Temperature readings are taken and recorded from one or more locations in the furnace.

A preheat furnace (Fig. 2) employs exhaust gas from the other furnace. Alloy steels are here given preliminary heating from atmosphere to about 900° F. before transferring to the high-heat furnace for further heating.

The arrangement of the burners in the high-heat furnace, and the baffles in the recirculating draw furnace, give uniformity of heating. As a final refinement for obtaining maximum heating uniformity and maximum straightness of the material, the charge is suspended from the furnace top (or roof) and the top is then revolved

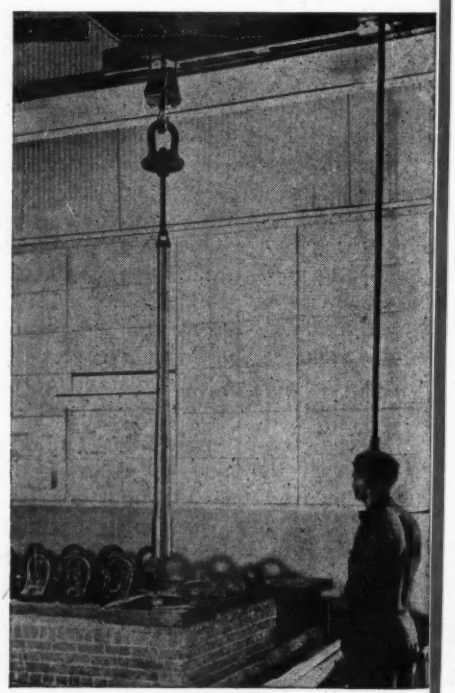
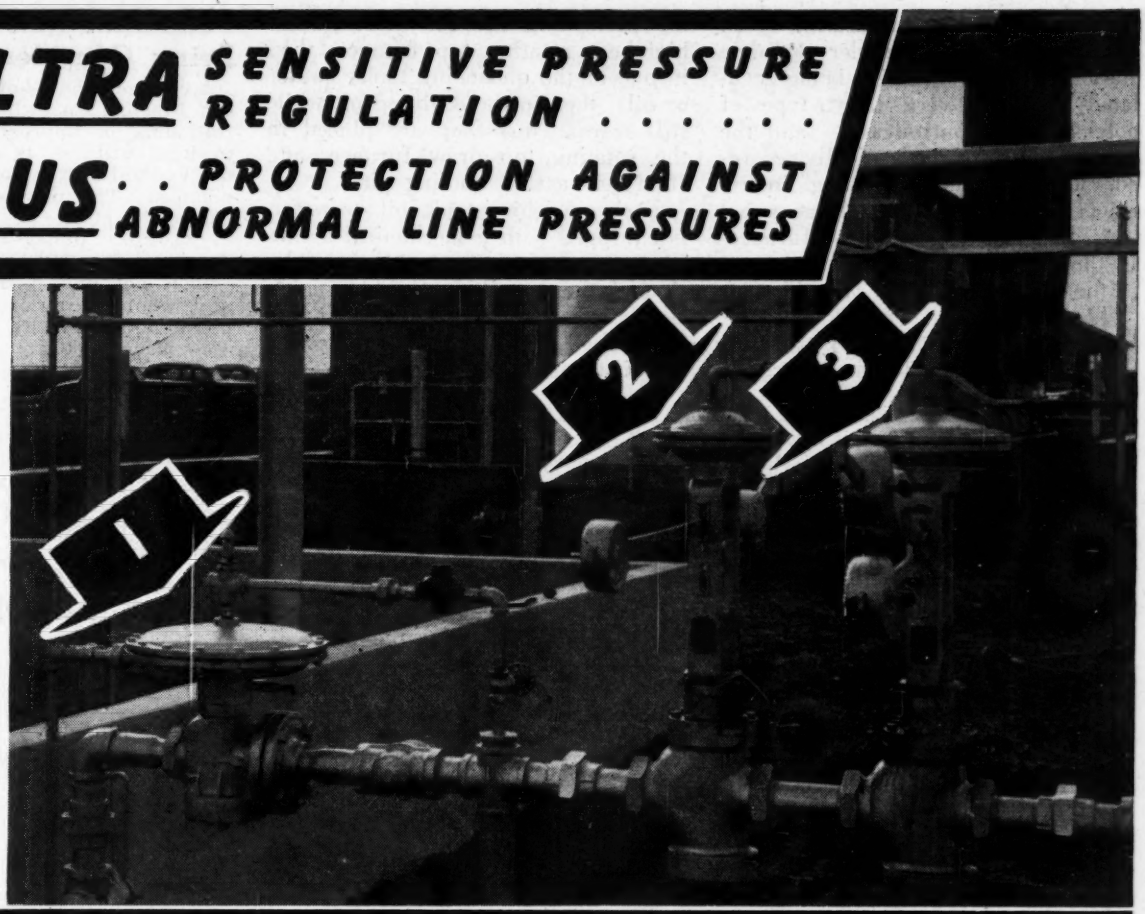


Fig. 2. Method of suspending 40 mm gun breech end down, on bail-type holder. (Preheat furnace.)

ULTRA SENSITIVE PRESSURE REGULATION . . . . . PLUS . . . PROTECTION AGAINST ABNORMAL LINE PRESSURES

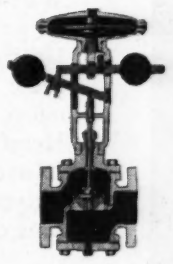


FISHER

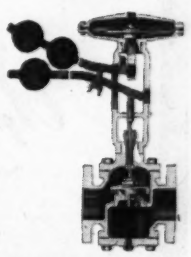
REGULATOR AND SAFETY SHUT-OFF VALVE INSTALLATION ON A GAS FUEL SUPPLY LINE IN A LARGE GULF COAST RECYCLING PLANT

1 A Type 781 Pressure Balanced Regulator with Type 77 pilot loader valve — maintains low downstream pressure with maximum sensitivity and dependability — provides pilot control performance with inherent stability of direct operated regulator — as illustrated utilizes upstream gas pressure as operating medium — for reduced pressure ranges 0 to 50 P. S. I.

2 A Type 10L Safety Shut-Off Valve designed to protect the low pressure system against excessive pressures that might result from the failure of a high pressure regulator or from some other abnormal condition — automatically closes with excessive increase of pressure on the diaphragm — suitable for 100 P. S. I. maximum pressure on the diaphragm.



3 A Type 10K Safety Shut-Off Valve to protect against danger of explosion resulting from loss of gas pressure which might extinguish burner or pilot flames — closes with loss of pressure on the diaphragm to eliminate the explosion hazard should the gas pressure be reestablished before the burners and pilots have been relighted — for maximum of 100 P. S. I. pressure on the diaphragm and a minimum cutout pressure of 2" W.C.



Both Safety Shut-Off Valves must be manually reset after abnormal pressure conditions have been eliminated. Available in globe type body sizes 1" to 3" screwed and 1" to 6" flanged.

For complete information on Fisher Automatic Controllers and their application to your specific needs — write today.

FISHER GOVERNOR COMPANY

834 Fisher Building • MARSHALLTOWN, IOWA

continuously during the heating cycle.

These furnaces are under complete automatic heat control — being regulated with the very latest type of potentiometer controllers — and the temperatures are automatically recorded. Controls and recording instruments are mounted on a large panel which is located close to the furnaces so the operator can observe progress of the work at a glance. (See Fig. 1).

The parts to be heat-treated are handled with an overhead traveling electric crane. They are first placed in the preheating furnace, then in the high-heat rotating top furnace, then in one of the quenching tanks (water or oil), then in the draining pit while still warm. Next they are placed in the rotating top draw furnace, and finally in a slow cooling pit.

Each quenching tank, oil or water, is equipped with a mechanical agitating system to insure maximum circulation of the quenching fluid. In addition, a large capacity circulating pump is installed in the oil tanks to circulate the oil through a cooling system.

Utility Appliance Expands Sales Distribution

M. Breslow, vice president of Utility Appliance Corp., Los Angeles, manufacturer of heating, cooling, and air-moving equipment and household appliances, announces the appointment of Higgins Industries, Inc., New Orleans builder of invasion landing craft, as distributors of the complete Utility line for Louisiana, south central Mississippi and southern Alabama. It was also announced that the F. C. Stearns Co., Hot Springs National Park, Ark., hardware wholesalers, will handle distribution of Utility products in the state of Arkansas.

Breslow also revealed that his firm will expand still further the company's prewar sales distribution, and that all the established products as well as several new ones will be marketed intensively throughout the country and abroad. The expansion of the line and of the sales organization mark the firm's 20th year of continued growth.

New Army Barracks To Use Gas

The Southern Counties Gas Co., Los Angeles, will supply gas for cooking, water heating, and space heating, to a disciplinary barracks for the army, which will be constructed at a cost of $5,000,000 on the site of Camp Cooke, on the north bank of the Santa Inez river, it has been announced by C. L. Ferry, industrial sales engineer for the company.

Panhandle Rate Change Being Considered by F.P.C.

A change in rates of Panhandle Eastern Pipeline Co., which may result in refunding of approximately $20,000,000 to local utilities, is being considered, the Federal Power Commission has announced. The new schedules are designed to effect an annual reduction of $5,000,000 under 1941 rates, as ordered by the FPC in 1942.

It is not known what difference, if any, would be reflected in the bills of retail gas consumers. Some local utilities have indicated they will pass along to retail consumers their share of refunded money. Others have not signified their plans. Under the proposed changes, Panhandle would place certain limitations on amount of natural gas to be delivered to immediate customers, most of which are local utility companies.

Pittsburgh Gas Rate Hearing To Be Held July 10

The Federal Power Commission has (1) denied the oral motion of the Pittsburgh & West Virginia Gas Co. and Kentucky West Virginia Gas Co. to dismiss the complaint of the City of Pittsburgh that the companies' natural gas rates subject to FPC jurisdiction are unreasonable, and (2) denied their application for the continuance of the hearing. The Commission has ordered that the hearing, which was recessed June 19, be resumed on July 10.

COMPLETE DATA ON A
Complete Line
When war regulations are lifted to permit manufacture again, Utility will be ready with a complete line of gas-fired Floor Furnaces, Unit Heaters, Circulating Heaters and Forced Air Furnaces, Illustrated literature on these outstanding appliances will be sent on request.
UTILITY Appliance Corp.
Formerly Utility Fan Corporation
Floor Furnaces
Unit Heaters
FORCED AIR FURNACES
Circulating Heaters
Standard Blowers
4851 S. Alameda St., Los Angeles 11, Calif.

NEW PRODUCTS

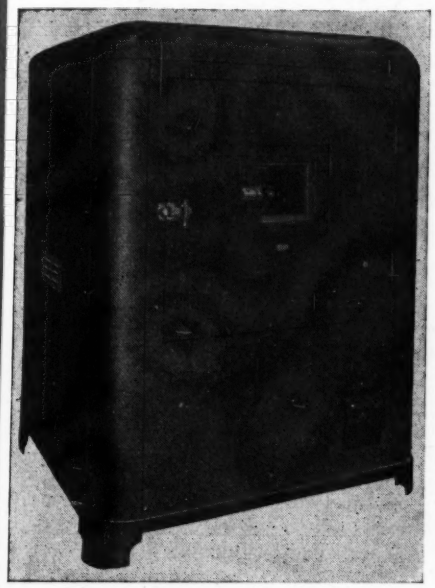
Self-Contained Oven

Industrial Oven Engineering Co., 11621 Detroit Ave., Cleveland 2, Ohio.

Model: A streamlined, compact and completely self-contained oven, for laboratory and pilot plant use.

Application: The oven is designed particularly for precision experimental work in drying, baking, evaporating, polymerizing, aging and heat treating, especially in cases where highly volatile solvents are used. Regardless of the inflammability or explosiveness of the solvents, the manufacturer states that the oven has insurance company approval.

Description: Sizes of oven working space range from 3 ft. x 3 ft. x 3 ft.



to 6 ft. x 6 ft. x 6 ft., in increments of 1 ft., and special sizes are furnished to specification. Temperature range up to 900° F., with a guaranteed differential of plus or minus 2° This oven is designed to use any type of fuel and the heating equipment is contained within the oven shell. Smaller models are shipped assembled, ready to connect to heat source.

It can be furnished with special construction to withstand corrosive fumes. Automatic temperature controls are provided to suit the processes for which the oven is to be used.

Rechargeable Flashlight Battery

Ideal Commutator Dresser Co., 2050 Park Ave., Sycamore, Ill.

Model: New "Ideal" Rechargeable Flashlight Battery.

Application: Where flashlights are used regularly, the rechargeable feature of the storage battery is said to provide greater economy, brighter, sustained light, and 40% greater capacity.

Description: Fits any standard flashlight case—using two 1-¼ in. size D dry cells, also 3 and 5 cell cases by means of a spacer plug. This battery may be charged from any AC electrical outlet by means of a rectifier type charger, or from the DC ignition system of automobile, truck or bus.

The light volume and brightness of the flashlight is controlled through regular, frequent charging. Instead of steadily growing dimmer, the firm states that the light from this battery is always bright with regular charging, because the voltage drop is only .4 volt. In two dry cells (which it replaces) the drop is 1 volt.

Temperature Controller

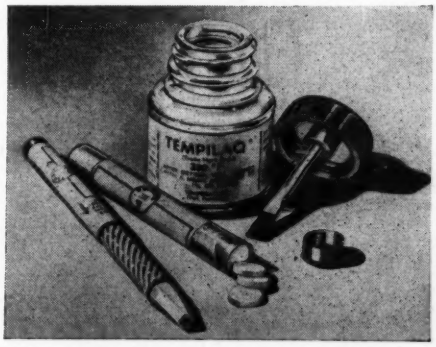
Tempil° Corp., 132 W. 22nd St., New York 11.

Model: Tempils° in three convenient forms—Tempilstik°, Tempil° Pellets, and Tempilaq°.

Application: It is stated by the manufacturer that Tempil° products provide a simple and accurate means of controlling temperatures in industrial fabrication and processing.

Tempilstik° is recommended for ease, speed and economy in most applications, including welding, heat-treating, general fabrication of metals, and particularly overhead, inclined or vertical surfaces.

Tempil° Pellets are suggested for signaling temperatures of extensive areas or large units; for measuring developed heat in engines, motors, gun barrels, etc.; or other applications where processing must be watched from some distance.



Tempilaq° (liquid form) is especially useful on the interior of tubes and other areas not conveniently accessible to Tempilstiks° or pellets; or for use on glazed or polished surfaces, such as glass, plastics, etc.

Description: All Tempil° products are said to be characterized by a sharp and rapid melting action at a given temperature. This shows when proper working heat is reached, or safe temperature limit is approached. All products are available in 25° intervals from 125° F. to 350° F. Tempilstik° ranges continues upward in 50° intervals to 900° F. Tempil° pellets and Tempilaq° are also available in 50° intervals up to 1600° F.

Catalogs

• **The Cochrane Corp. of Philadelphia** has issued a new publication on Rotameters, containing in addition to catalog material on the Cochrane line, helpful data on the selection of a Rotameter for any particular service. Specific gravities of gases and of various metals used in floats are given, together with formulae for converting water and air capacities to terms of other liquids and gases. Other selection factors, such as pressure drop, length of scale and float material are covered also in this publication, No. R-100 A, a copy of which may be had by addressing Cochrane Corp., Philadelphia 32, Pa.

The Cochrane Corp. also has available for distribution their Reprint 39, which discusses briefly the removal of ammonia from boiler feed water. This discussion takes into account three practical methods such as use of a deammoniator, the use of chlorine and the use of an acid-regenerated zeolite. These methods would be of interest to engineers in whose plants deterioration of copper and brass parts has taken place, because of ammonia contamination.

• **Marlow Pumps,** Ridgewood, New Jersey, has issued a handbook on pumps, entitled "Self-Priming Centrifugal Pumps," by A. S. Marlow, Jr. This treatise sets forth the principles of centrifugal action, the physics of pumping and the evolution of self-priming centrifugal pumps. The use of simple, straightforward language make it a work that almost anyone can understand and profit by.

Besides giving basic engineering information, the booklet tells the difference between the types of self-priming centrifugals, points out where self-primers can be used with best effect, and details how to install and care for them. Copies of the handbook may be had without cost by writing to Marlow Pumps, Ridgewood, N. J.

• **North American Philips Co., Inc.,** 100 E. 42nd St., New York, has issued a new eight-page illustrated booklet describing the "Geiger-Counter Spectrometer for Industrial Research." Written by H. Friedman of the naval research laboratory, the article has been reprinted in booklet form by permission of the Navy Department.

The author discusses in detail the theory underlying X-ray powder diffraction, how the NORELCO spectrometer works, its performance and applications. Photos, diagrams and curves are used to illustrate the text matter. Geiger-counter tubes, circuits and losses are covered at some length, and an explanation is given of the "flip-flop" counting action.

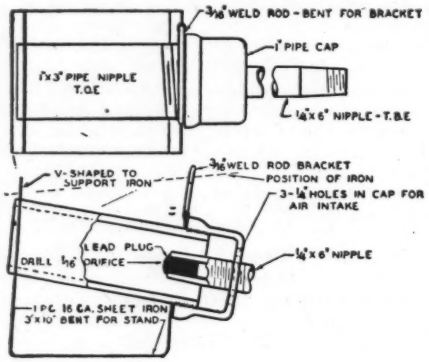
OPERATING IDEAS

Gas Blow Torch

Approximate Cost, $1.00

G. E. CRANN, Arkansas Louisiana Gas Co., Shreveport, La. Presented before 1944 Wrinkle Class, Southwestern Gas Measurement Short Course, College of Engineering, Oklahoma University, Norman, Okla.

This gas blow torch seems to give better results than the gasoline blow torch. It is also faster, easier to use, has more uses and is safer. It is made of one ¼ in. x 6 in. pipe nipple TBE, one 1 in. x 3 in. pipe nipple TOE, one 1 in. pipe cap, one piece ⅛x3x10 in. sheet iron and a small piece of 3/16 in. welding rod. Thread one end of ¼ in. nipple 1½ in. Plug long threaded end with lead about


3/16" WELD ROD - BENT FOR BRACKET
1" PIPE CAP
1"x3" PIPE NIPPLE T.O.E.
¼"x6" NIPPLE - T.B.E.
V-SHAPED TO SUPPORT IRON
3/16" WELD ROD BRACKET POSITION OF IRON
3-¼" HOLES IN CAP FOR AIR INTAKE
LEAD PLUG
DRILL 1/16 ORIFICE
¼"x6" NIPPLE
1 PC. 16 GA. SHEET IRON 3"x10" BENT FOR STAND

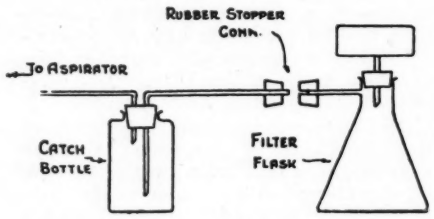
½ in. Bore 1/16 in. hole in center of plug for orifice. Bore and tap 1 in. pipe cap in center for ¼ in. pipe. At equal distances around hole in center bore three ¼in. holes for primary air intake. Screw ¼ in. nipple (plugged end) with 1 in. pipe cap; also, the 1x3 in. TOE nipple. Bend and cut sheet metal for stand so that front of torch is ½ in. to ¾ in. higher than rear. Approximate cost of material and labor not over $1.00.

Vacuum Filtration Apparatus

Affords Vacuum Breaking Connection

From A.G.A.'s "Report of Subcommittee on Wrinkles." W. R. FRASER, Michigan Consolidated Gas Co., Detroit, Chairman.

The filter flask arrangement shown is particularly useful in affording a rapid vacuum breaking connection between filter flash and catch bottle without disturbing the source of vacuum. The rubber stopper connection makes a good seal when wet and can easily be broken when it is necessary



to remove the flask for further manipulation. The flask may be quickly removed by compressing the stoppers at the joint and thus permitting a leak in the system.

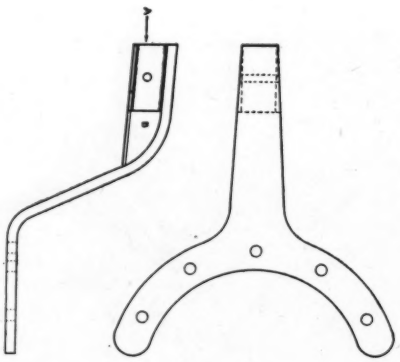
Compressor Engine Tool

For Removing Exhaust Chamber Wrenches

C. R. CARTER, chief engineer, Haven Compressor Station, Panhandle Eastern Pipe Line Co.

With this tool for the removal of exhaust chamber wrenches from Cooper-Bessemer engines it is estimated that 45 minutes are saved on each change when the inlet valve is not to be removed. The chances of personal injury and material breakage are also greatly reduced. It has been in use for the past three years.

It is made of ¾ in. iron plate, as



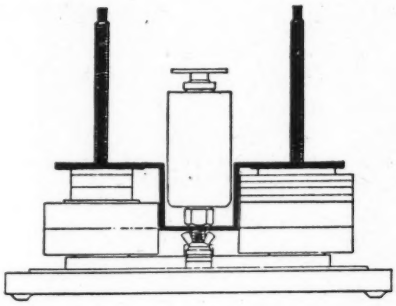
per drawing. Directions for use are as follows: Remove the valve guide from the exhaust valve chamber, bolt the wrench to the chamber, and insert the engine jack-bar at point A. Secure this with a bolt or pin through ½ in. hole. Suspend a Cooper-Bessemer head wrench from a crane and fasten to the chamber wrench at point B with a short loop of chain or cable. This hookup will allow sufficient reach under the lay-shaft. Loosen the nuts securing the chamber to the cylinder. Balance the weight of the chamber by weight applied to the jack-bar handle, remove the nuts, and move the chamber as desired, by means of the crane.

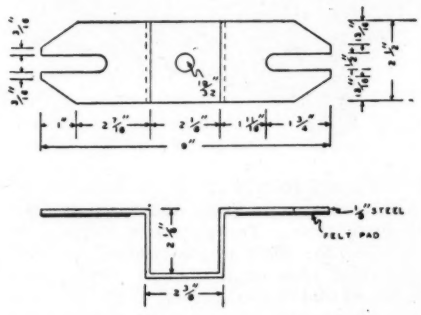
Weight Clamps

For R-S Dead Weight Gauge

HAROLD VERNON, Oklahoma Natural Gas Co., Tulsa. Presented before 1944 Wrinkle Class, Southwestern Gas Measurement Short Course, College of Engineering, Oklahoma University, Norman, Okla.

Original equipment on these dead weight gauges is a knurled thumb nut which is screwed down on the supports on a thread some 4 or 5 in. long. Inasmuch as the deadweight

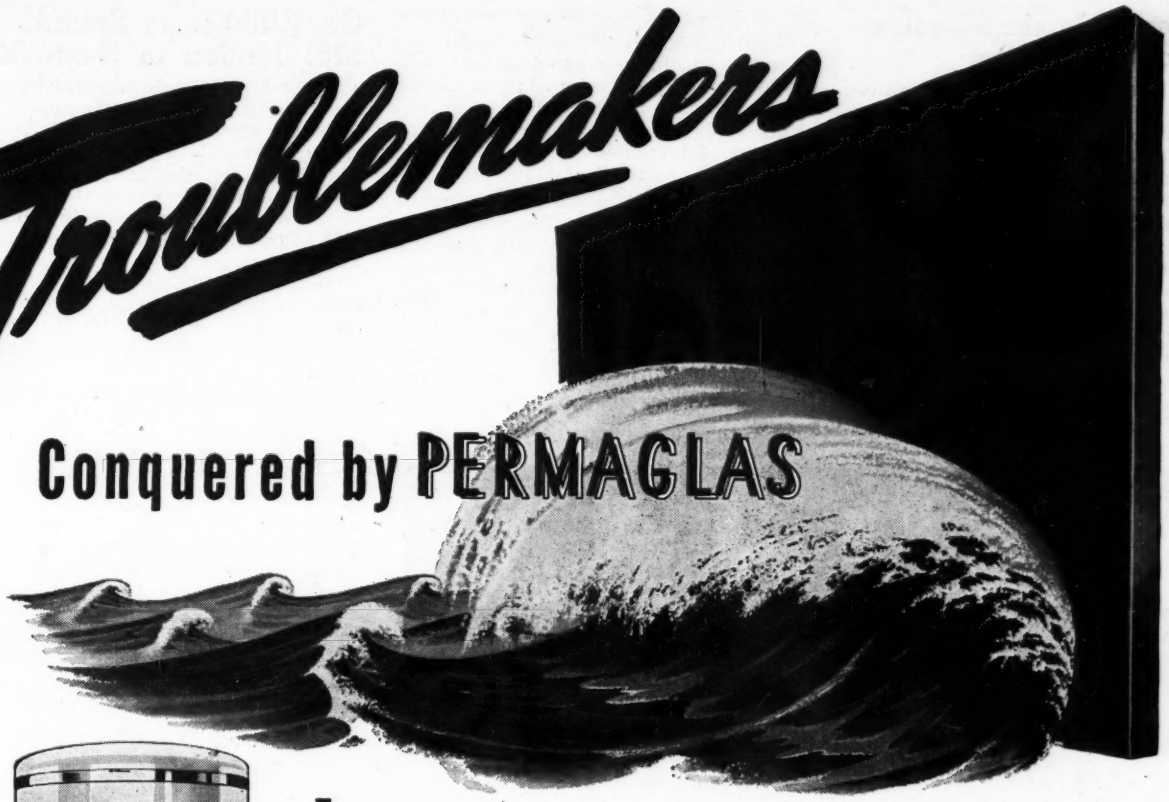


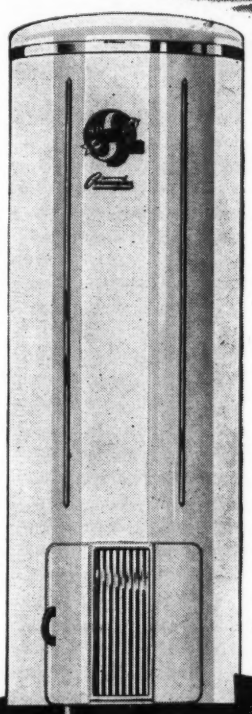


gauge itself is screwed into a receptacle between the two weights, we have found that the use of this clamp at this recess, extended below the gauge, and the arms projecting over the weights on either side will do an excellent job and will permit the removal of the weights after the one operation of removing the dead weight gauge. Ordinarily 500 lbs. of weights of the various sizes and descriptions are carried. Any number of weights up to the maximum capacity of weights may be carried by changing the length of the recess from the top of the weights to below the dead weight gauge.

Troublemakers

Conquered by PERMAGLAS



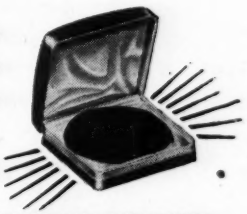


IN the course of the 23,000 test-years that led to the perfection of the *Permaglas* formula, troublemakers galore were found in every type of water analyzed by A. O. Smith laboratories . . . and even the worst of these troublemakers are effectively "stopped in their tracks" by *Permaglas.*

In some waters, for instance, tannic acid is a mighty bad actor! It attacks ferrous metals, forms a bluish-black ferrous salt, which acts like ink or dye. SMITHway engineers have fortified *Permaglas* to resist tannic acid and all the other weapons water uses to attack most water heaters. That's why hot water from SMITHway *Permaglas* Water Heaters is always clear and pure as the original source of the water itself.

There is only *one Permaglas* . . . the sparkling blue, mirror-smooth, glass-fused-to-steel, perfected only after long years of time, patience and a multitude of scientific tests that prove *Permaglas* conquers water's troublemakers.

Write for "The Inside Story of *Permaglas*" . . . a great sales aid.



"THERE IS ONLY ONE PERMAGLAS"

"HEATED WITH GAS, STORED IN GLASS"

Buy an Extra War Bond This Month

A. O. Smith Corporation
Dept. GA-345H, Milwaukee 1, Wis.

Please send me a copy of "The Inside Story of *Permaglas.*"

Name.....

Company Name.....

Address.....

City and State.....

SMITHway Permaglas GLASS LINED

Oklahoma Revises Hugoton Spacing Regulations

The Oklahoma Corporation Commission, effective June 1, issued an order which supersedes Commission order 17,410, effective last January, applying to the Oklahoma Sector of the Hugoton Gas field.

It brings regulations as applying to that field, in conformity to House Bill 257, passed at the recent session of the Oklahoma Legislature. It requires gas wells to be drilled on spacing units of not less than one section nor more than 800 acres. Each well shall be drilled at the center of its unit when possible and in no event further than 467 ft. from the center.

When there are divided or undivided interests within any spacing unit and the owners of such interests are unable to agree on a pooling plan, then the rights and obligations of such parties shall be determined by the FPC as provided in section 4 of House Bill 257.

The order provides for establishment of two market demand hearings each year, one beginning on April 1 and the other beginning on October 1. In these hearings the companies shall make their nominations and the commission will, from evidence presented, fix allowables for each well for each month in volumes which, in its opinion, can be produced without waste.

WARREN
LIQUEFIED PETROLEUM GAS

Attention: UTILITY GAS PLANT OPERATORS!

WARREN OFFERS:

1. Adequate Supply of High Quality Liquefied Petroleum Gas for Small City Gas Plants.
2. Prompt Deliveries from Warren's Expanded Production, Storage and Shipping Facilities.
3. The Broad Experience, Engineering Advice and Consulting Service of Warren's Trained Organization.

To Utilities Interested In:

1. Plants now using Liquefied Petroleum Gas.
2. Conversion of Manufactured Gas Plants.
3. Small Cities without Utility Gas Service.

Write us about your present or future Liquefied Petroleum Gas requirements.

WARREN PETROLEUM CORPORATION
Tulsa, Oklahoma Houston, Texas

Gas Utilities to Spend $251 Million in Next Year

The gas utilities in the United States, which will enjoy an estimated total revenue of $1,080,000,000 in the 12 months' period following V-E Day, are planning to spend $251,113,000 in that period for additions, maintenance, materials and supplies, according to a Federal Power Commission release of June 17.

Of this total, $171,000,000 will be for gross additions to plant, $70,000,000 for maintenance, and $10,000,000 for increasing inventories of materials and supplies.

Natural gas companies will spend $160,898,000, manufactured gas companies $90,215,000. Plant additions for natural gas companies will total $119,848,000, as against $51,568,000 for manufactured gas companies. The expenditures will be financed primarly from funds on hand and from current operations. Other financing will be provided by approximately $19,000,000 of new securities. The indicated ratio of funded debt to gross additions to plant will be less than 5% in the gas industry.

Business Planning Institute For Distribution Groups

The California State Department of Education is organizing a Business Planning Institute for the purpose of providing vocational instruction in the distribution industries. The plans involve a series of meetings in various communities at which competent lecturers will be provided on such subjects as modern merchandising methods, store modernization, both interior and exterior, display principles, personnel selection and training, cost controls, advertising and sales promotion. Hughes M. Blowers, regional supervisor, Distributive Education, whose office is at the University of California, Berkeley, is leading the project.

Surface Combustion Consolidates N. Y. Offices

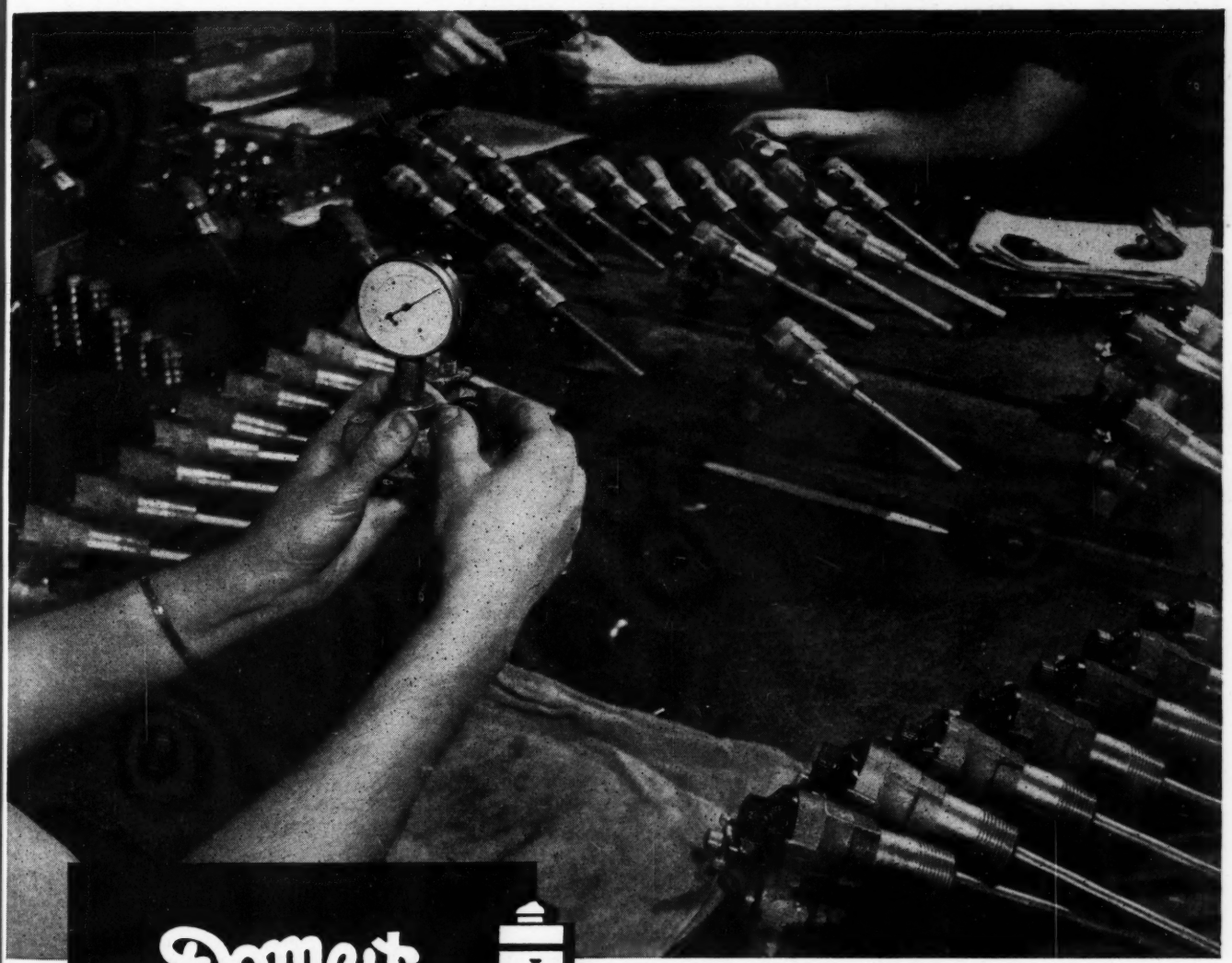
All New York City offices of Surface Combustion Corp., with headquarters at Toledo, have been consolidated at 315 Transportation Bldg., 225 Broadway, New York 7, as of May 1, the company announces. The move makes possible one centralized location for all divisions including the Janitrol gas-fired space heating division, Janitrol aircraft and portable heater divisions, industrial heating division and the Kathabar humidity control division. Personnel and operations of each division remain unchanged.

Slaff to Head F. P. C. Natural Gas Investigation

The Federal Power Commission is now assembling its staff to conduct its previously announced natural gas investigation, having named as chief counsel for the investigation staff George Slaff, who has recently returned to the Commission after two and a half years overseas duty with the American Red Cross. Slaff formerly was on the legal staff of the FPC, having spent most of his three years' service there on natural gas work.

ACCURACY
is custom built into Domestic Thermostats

Every water heater thermostat made by Domestic is practically a custom built product. It has to be individually tested and constantly checked all along the assembly line for precision and dependability. For instance. each thermostat is hand set with the aid of a dial indicator to insure correct valve opening... Accurate control of gas flow is but one exactness your customers will buy when you sell them Domestic controlled water heaters.



Domestic
WATER HEATER THERMOSTATS
AND AUTOMATIC PILOTS

DOMESTIC THERMOSTAT COMPANY

156 W. Pico Boulevard · Los Angeles 15, California

PEOPLE

• **Dr. F. E. Vandaveer,** manager, testing and inspection department, of the A.G.A. Testing Laboratories, resigned May 31 to join the staff of the East Ohio Gas Co., as chief chemist, with headquarters in Cleveland. He takes the position formerly held by the late **Charles F. Turner,** 1944 chairman of A.G.A.'s Technical Section, who was lost in the Cleveland fire last October.

F. E. Vandaveer

Vandaveer has been associated with the Laboratories for the past 20 years and at one time or another headed every department, including testing, research and war work. From 1933 to 1937 he was located in Los Angeles in charge of the West Coast branch.

Before joining the Laboratories, Vandaveer worked for several summers as a cadet engineer for the Peoples Gas Light and Coke Co. in Chicago.

Appliance testing activities previously headed by Vandaveer will be supervised by **K. H. Flint,** who has been with the Laboratories for more than 19 years.

• Commissioner **John W. Scott** of Indiana resigned from the Federal Power Commission June 15, to return to the private practice of law in the City of Washington. Coming to Washington in 1935, Scott served for two years in the Department of Justice, as special assistant to the attorney general in charge of utility matters for the government, and for several months also served as head attorney for the Alien Property Bureau.

• The recent appointment of **W. L. Hutcheson** as sales manager and **James E. Coleman** as assistant sales manager of the Pittsburgh Group of natural gas companies of the Columbia Gas & Electric Corp., have been announced by **C. E. Bennett,** president of the Manufacturers Light & Heat Co., Cumberland & Allegheny Gas Co., Gettysburg Gas Corp., and the Natural Gas Co. of West Virginia.

Hutcheson, since 1934 the utilities' merchandise sales manager, will now supervise domestic and industrial gas sales, merchandising programs, home service activities and utility advertising.

Coleman joined the Manufacturers Light & Heat Co., as an industrial engineer in 1937 and until entering the Army in 1942 he served the natural gas companies in the Pittsburgh group in various industrial engineering capacities. Upon receiving his recent discharge from the Army, where he was a Captain in the Ordnance Department, Coleman returns to the utility group as assistant sales manager.

• **Franklin F. Schauer,** president of the Equitable Gas Co., Pittsburgh, and the Pittsburgh and West Virginia Gas Co., retired June 1 after 25 years' service with these companies.

Schauer first entered the gas field in 1899, starting as a clerk with the United Gas Improvement Co., of Philadelphia. In 1920 he entered the employ of the Equitable Gas Co. as assistant to the general manager. In 1942, after a succession of promotions, he was made president of Equitable and the Pittsburgh and West Virginia company, the position from which he retired.

Ward Perrott, president of the Louisville Gas and Electric Co. (Delaware), and a director of the Equitable and Pittsburgh and West Virginia companies, succeeds Schauer as president of the two companies.

• **John deB. Shepard,** air-conditioning engineer, Consolidated Gas, Electric Light and Power Co., Baltimore, Md., and chairman of the joint committee on gas summer air-conditioning of the industrial and commercial gas section and the residential gas section, American Gas Association, has recently announced his resignation from both of these groups to be a consultant in air-conditioning.

Shepard will be associated with P. L. Davidson, consulting engineer in air-conditioning ,and he will specialize in the textile field, making his headquarters in Greenville, S. C.

• **B. C. Adams,** president and general manager of the Gas Service Co., Kansas City, Mo., has announced that **Glen Blauvelt,** former manager of the Monett, Mo., group of properties, will succeed **Jesse Adams** as manager of the Beloit group.

Adams and **Bert Ratcliff,** foreman, lost their lives May 20 in an accident occurring in a company regulator pit located near the Beloit business district.

Carl H. Jenkins, who has been chief clerk of the company with headquarters at Aurora, was chosen to succeed Blauvelt as manager of the Monett group.

• The following news of several former members of the A.G.A., Cleveland and West Coast Laboratories, now serving with the armed forces, has been recently received by the Association:

Lt. (jg) Frank Fiedler is home on leave, following his rescue at sea when his aircraft carrier was sunk off Iwo Jima. **Lt. (jg) Richard Saller,** participated in the Luzon invasion aboard a landing ship. **Capt. Robert T. Hlavin,** with the famed 37th division, has now been overseas in the Pacific, for 34 months. **Lt. Commander R. B. Kleinhans** writes from Annapolis, where he is stationed, that **John B. Heinicke,** also stationed there, has been promoted to the rank of Commander. **Lt. Oscar N. Simmons** now heads the inspection of munitions for the Navy at Las Vegas, Nevada.

• The following changes in Pacific Gas and Electric Co.'s personnel took place July 1:

Arthur D. Church, office assistant to A. Emory Wishon, vice president and general manager in San Francisco, became manager of the Stockton division, succeeding **H. B. "Jack" Heryford,** who is retiring after more than 42 years' service with the company and its predecessors.

Forrest U. Naylor, administrative assistant in the department of public relations, became manager of the credit and collection department.

• **E. G. Diefenbach** has recently been elected a member of the board of directors of Panhandle Eastern Pipe Line Co. A pioneer in the sale of natural gas securities to the investing public, Diefenbach was one of the principal founders of United Gas Corp. He now holds the following positions: Chairman of the executive committee of Certain-teed Products Corp., a member of the executive committee of Internaitonal Utilities Corp., president of Electric Ferries Inc., and securities Corporation General.

• **Dr. Willard L. Thorp,** co-trustee of the Associated Gas and Electric Co., New York City, has been added to the board of directors of Jersey Central Power & Light Co. Thorp, who was appointed co-trustee for Associated Gas in 1940, is also chairman of the board of NY-PA-NJ Utilities, a director of the Associated Electric Co., and General Gas and Electric Corp.

• The appointment of **E. E. Stovall** as superintendent in charge of gas measurement for the Lone Star Gas Co., Dallas, has been announced by **Julian Foster,** superintendent and chief engineer for Lone Star. Stovall succeeds **Don A. Sillers,** who resigned to enter private business.

• **Cecil R. Carter,** former chief engineer for Panhandle Eastern Pipe Line Co.'s compressor station at Haven, Kans,. has been appointed as superintendent of the company's Eastern compressor division at Jacksonville, succeeding **W. K. Short,** who passed away last **February.**

• **L. D. Greene** has been appointed subdistrict manager for the Lone Star Gas Co., it has been announced by **L. B. Denning, Jr.,** operating manager of the company. Greene succeeds **A. H. Lawson,** who has been transferred to Seymour.

• **B. W. Reynolds,** former manager of domestic sales of the Pacific Gas and Electric Co., resigned June 15 to become manager of the appliance division of the General Electric Supply Co., San Francisco. His territory will cover northern and central California.

meters and regulators

INDIVIDUAL OR COMBINATION UNITS

Not ... war dre... ut an act...ity

WRITE FOR YOUR COPY NOW

THE NEW SPRAGUE SHOP MANUAL NO. 17

THE SPRAGUE METER COMPANY
BRIDGEPORT • CONNECTICUT

DAVENPORT, IOWA
LOS ANGELES, CAL.
HOUSTON, TEXAS
SAN FRANCISCO, CAL.

Manufacturers

• The appointments of **C. F. Cushing** as distribution manager, and of **James N. Crawford** as sales manager of the gas heating division, Bryant Heater Co., Cleveland, have been announced by **Lyle C. Harvey,** president.

Cushing, an active member of the American Society of Heating and Ventilating Engineers, and formerly associated with the Frigidaire Corp., has been a member of the Bryant staff since 1935.

Crawford, a member of the American Gas Association testing laboratory following his graduation from Case School of Applied Science, has been associated with Bryant for the past 12 years.

• **Willis M. Marshall** has been appointed northeastern district sales manager for the American Central Manufacturing Corp., Connersville, Ind., manufacturers of steel kitchen sinks, wall, and base cabinets, according to a recent announcement by **C. Fred Hastings,** general sales manager of the firm.

For the past nine years, Marshall has been associated with the Horton Manufacturing Co. of Fort Wayne, holding the position of parts and service manager.

• **J. E. Gesner** has recently rejoined the staff of Reliance Regulator Corp. as engineer. He was formerly associated with this company in 1929-30. His background includes 15 years with the Pacific Gas & Electric Co. and a scholastic background of Polytechnic College of Engineering, Oakland, Calif., and the University of California.

J. E. Gesner

Starting with the East Bay Division of Pacific Gas & Electric, Oakland, in the gas department, Gesner advanced to the Colgate Division as measurement inspector, eventually occupying the post of industrial gas engineer of the general sales department, San Francisco.

• **Nelson B. Buehrer** has become a new member of the F. J. Evans Engineering Co., according to a recent announcement by that firm. He will direct sales of heating and air-conditioning equipment to the dealers and gas utilities served by the company throughout the south.

• **H. T. Simpson** is the new Pacific Coast manager of the Whitehead Heater Co. Division, Whitehead Metal Products Co., New York, manufacturers of gas-fired water heaters. He will make his headquarters at the Los Angeles' office, 3507 W. 6th St.

• At a recent meeting of the directors and stockholders of the Florence Stove Co., it was announced that **R. L. Fowler** was elected chairman of the board and **Eugene Holland** elected president of the company.

Obituaries

• **Myron J. Czarniecki,** vice president in charge of sales for A. M. Byers Co., manufacturers of heating equipment, died June 18 at his home, near Pittsburgh, at the age of 53.

Czarniecki entered the employ of the Byers organization in 1913. He was advanced to general manager of sales in 1930 and his election to vice president in charge of sales came in 1934.

• **Fred S. Dewey**, general sales manager of the Cincinnati Gas & Electric Co., succumbed to a heart attack May 27, at the age of 64.

Before becoming affiliated with the Cincinnati company 17 years ago, Dewey was vice president in charge of sales for the Kansas City Power & Light Co.

• **P. L. Butz,** for 20 years in sales promotion for the American Radiator & Standard Sanitary Corp., Los Angeles, died May 10th of a heart ailment at the age of 60.

• **Robert Thompson,** distributor of Rudd gas water heaters in the St. Louis, Mo. area, died suddenly at home the latter part of April.

Customers like its

NEAT APPEARANCE!

AND good looks are only one of the many advantages of Transite Flue Pipe!

Light in weight, Transite Flue Pipe can be cut to size on the job, goes up readily, requires little support. It is rustproof, needs no paint.

Transite Flue Pipe is furnished in round and oval shapes, in sizes for all normal requirements. A complete line of fittings, couplings and other accessories is available.

* * *

For full details, write for booklet TR-13A. Address: Johns-Manville, 22 East 40th Street, New York 16, New York.

Johns-Manville

TRANSITE FLUE PIPE

For venting gas-burning appliances

Public Service of Indiana Plans To Sell Gas Properties

Subject to the approval of the Securities and Exchange Commission, the gas and water properties of the Public Service Company of Indiana are to be sold to a new company to be organized, according to an announcement by Robert A. Gallagher, president. This step will make Public Service a strictly electric utility. Petitions were filed with the Public Service Commission of Indiana on June 22.

This new company, which would be placed under trained and experienced personnel drawn from Public Service Co. in the main, would be financed by the sale of its common capital stock to Public Service, and by the placing of a $6,000,000 mortgage on the gas and water utility properties, which have a total value in excess of $14,500,000. Employee programs, such as insurance and retirement plans now in force with Public Service Co., would be adopted by the new company.

Gallagher states that the decision was made, after extended studies, in the interest of developing both the electric and gas utilities to their fullest extent.

Under the program, the company plans to refund its present $59,314,500 first mortgage bonds, and its $14,818,590 of preferred stock, besides prepaying $7,750,000 of serial notes. It would do this refinancing chiefly by means of a new $48,000,000 mortgage bond issue, the issuance of $13,000,000 in new notes, and the sale of $15,000,000 of new preferred stock. This move, Mr. Gallagher explained, would save Public Service about $495,000 a year in interest charges, on present security rates, and before payment of Federal income taxes.

Employees Help Canadian Company Solve Meter Shortage Problem

To avoid a threatened shortage of meters and regulators, caused by service requests greatly exceeding company estimates, and the construction of many new houses, equipped for gas only, the Northwestern Utilities, Ltd., Edmonton, Alberta, Canada, asked a number of their employees and others, whose consumption had been established, to consent to the removal of their meters, on the understanding that they would be charged the same amount each month, as was charged for the corresponding month the previous year. This proved a satisfactory solution to the problem, these meters then being installed in the new homes.

The Canadian company has also disclosed its installation of permanent aerials at three valves along the Vegreville line for portable transmitting-receiving radios. According to the company, these radios proved to be a great success when used during a main line test last November. They are said to have given much better communication than private long-distance telephone.

Surface Combustion Proposes Home Planning Bureaus

The establishment of nationwide home-planning bureaus, making available to home owners and home planners, helpful and authentic information on latest principles and equipment for enhancing home conveniences and comfort, was one of the features of an all-day meeting held recently in Toledo, by Surface Combustion Corp. for its field representatives from all parts of the country.

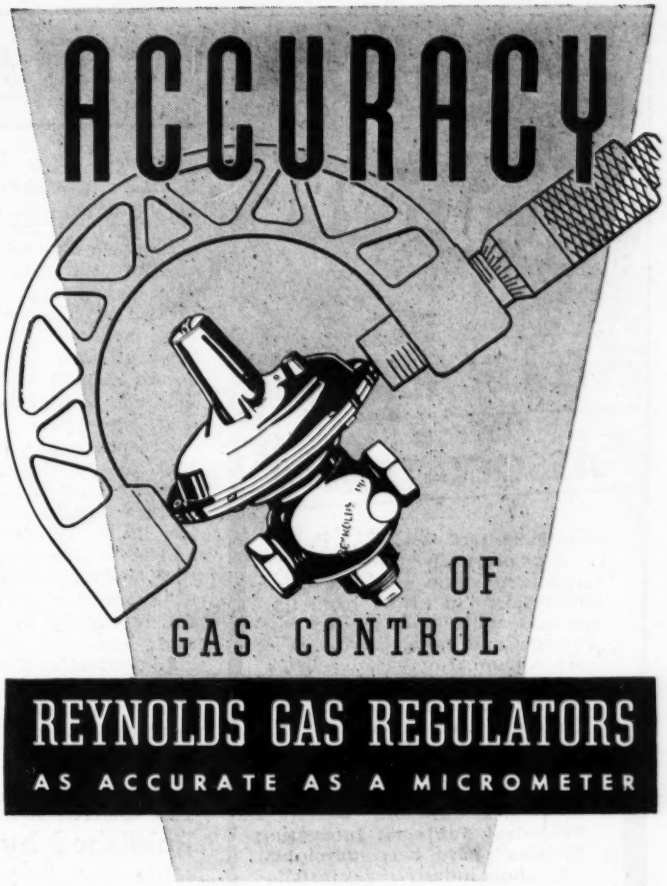
Seven nationally known architects, as well as specialists on interior decorating, kitchen planning, selection of appliances and heating systems, will assist in working out the details of the home planning bureau.

Included in the plan is a book especially written for G.I. Joe, to help him with his plans for financing, planning and building his own home upon his return to civil life. A series of house designs by architects is also included.

Glycerine Solution for Filter Bases of Air-Conditioning Systems

Research at the laboratories of the Glycerine Producer's Association indicates that a glue-glycerine-water solution makes a good moistening material for filter bases such as are used in heating and air-conditioning systems. A solution of 0.2% glue in 50% glycerine was found satisfactory.

This mixture has a great advantage over oil-base treatments in that when the filter becomes dirty and clogged, it can easily be washed clean with cold water and a fresh solution applied. Aside from the elimination of fire hazard, such treatment with the aqueous glycerine-glue mixture results in a substantial economy over the common throw-away units.



REYNOLDS GAS REGULATORS

AS ACCURATE AS A MICROMETER

● Reynolds Regulators insure accurate Gas Control. They will operate accurately either individually or in series, depending upon the conditions under which they operate . . . Long life, efficient operation, accurate regulation, reasonable cost, low upkeep—these are the vitally important inherent features built into REYNOLDS Gas Regulators through more than 50 years experience in developing, designing, building and testing Gas Control equipment . . . For complete cooperation of our Engineering Department, write our Factory, Branch Offices or Representatives.

Representatives

Eastern Appliance Company
Boston Massachusetts

Wm. A. Ehlers
No. 268 Park Street
Upper Montclair, N. J.

Branch Offices

423 Dwight Bldg.
Kansas City, Missouri

2nd Unit,
Santa Fe Building
Dallas, Texas

gas control since 1892

REYNOLDS GAS REGULATOR CO.

ANDERSON, INDIANA, U. S. A.

ASSOCIATIONS

P·C·G·A TEL-U-TYPE FLASH NEWS OF YOUR ASSOCIATION

Good Publicity Results. The P. C. G. A. Cooperative Advertising Committee is now getting excellent results "in print" from its contacts with, and service to, Pacific Coast trade journal editors. A number of feature articles have been published during the past three months, including several on commercial cooking and others featuring "live-wire" gas appliance dealers.

Technical Subjects. Interesting "stories" have been developed also, about industrial gas installations, including some in war plants. Several of these have been accepted by editors and will be published shortly. Many difficulties have had to be overcome in obtaining information and official "releases," especially where Army and Navy contracts were involved, but perseverance has been rewarded in most cases.

Territories Represented: With the cooperation of local gas men, material has been obtained in San Diego, the Los Angeles metropolitan area, the Santa Cruz-Watsonville territory of "Coast Counties," and in "P.G. & E.'s" various divisions.

Your Cooperation Needed. Please report to Clifford Johnstone, managing director, P. C. G. A., 447 Sutter Street, San Francisco 8, any ideas you may have for articles on gas utilization in California... especially new or unusual commercial and industrial applications. The Committee will see that these are followed up.

Watch This Column Monthly

THE WEST PREFERS GAS

Flora Dowler Wins A.G.A. Water Heating Contest

Flora G. Dowler, home service supervisor of the Pittsburgh group of natural gas companies affiliated with the Columbia Gas & Electric Corp., has been awarded the first prize of $150 in war bonds for her entry in the recent contest sponsored by the water heating committee of the American Gas Association.

Accepting the committee's suggestion that a specific idea was desired regarding how home service could promote adequate gas water heating service, Miss Dowler conceived a chart and a standardized home service lecture, both concerning the effectiveness of hot water at various temperatures for a variety of uses in home, store and shop.

In 1943 Miss Dowler achieved recognition by winning the McCall Gas Utility Home Service Contest, and last year was one of the winners in a contest held by Ruud Manufacturing Co.

Air-Conditioning Report Published by A.G.A.

John deB. Shepard, chairman of the joint committee on gas summer air-conditioning of the industrial and commercial gas section and the residential gas section of the American Gas Association, has announced the publication of the committee's report—"Technical Advances in Gas Summer Air-Conditioning." The committee has carefully analyzed the possibilities of gas summer air-conditioning which will be the greatest direct aid to the promotion of gas utilization in this field. The report is covered in seven chapters beginning with a review of postwar possibilities of gas summer air-conditioning by Mr. Shepard.

This report should serve as a guide for company activities in the field of gas summer air-conditioning for industrial, commercial, and residential gas installations.

S.C.M.A. Elects Officers

The following men were elected as officers of the Southern California Meter Association at a meeting held June 21: G. L. Hutchings, Tidewater-Associated Oil Co., president; Lee Cheever, Southern Counties Gas Co., vice president; G. G. Cortelyou, General Petroleum Corp., treasurer; G. H. Forster, Jr., The Texas Co., secretary, and Mark McIlvaine, Chanslor Canfield Midway Oil Co., past-president.

P. U. A. A. Elects Officers

E. N. Pope, Carolina Power & Light Co., Raleigh, N. C., was elected president of the Public Utilities Advertising Association at a recent business session of the organization held in Chicago. He succeeds Russell I. Seymour of the Kansas City Power & Light Co.

Other P.U.A.A. officers for the coming year are: James V. MacDonald, Boston Edison Co., first vice president; Charles J. Allen, Connecticut Light & Power Co., Waterbury, Conn., second vice president; Robert Plowe, Commonwealth Edison Co., Chicago, third vice president; Waldo M. Wright, Amarillo Gas Co., Amarillo, Texas, secretary, and Dale Remington, Wisconsin Public Service Corp., Green Bay, Wis., treasurer.

Monthly Literature Review Offered by Gas Institute

The Institute of Gas Technology, Chicago, on June 7 distributed its first issue of "Gas Abstracts," a monthly review of current literature relating to the gas industry, which represents the inauguration of a new phase of service to the industry by the Institute. For some time the library and the technical staff have been preparing abstracts of papers appearing in technical journals for their own information. "Gas Abstracts" will be prepared by assembling each month abstracts which have been prepared in this manner.

Articles which seem to be of immediate interest will be selected, thus bringing pertinent technical information before the industry while it is current. All papers and publications which are abstracted will be available for use in the library. Copies in the form of photostats or microfilms will be provided at cost. The scale of prices will be published in an early issue. Requests for copies should be addressed to the library.

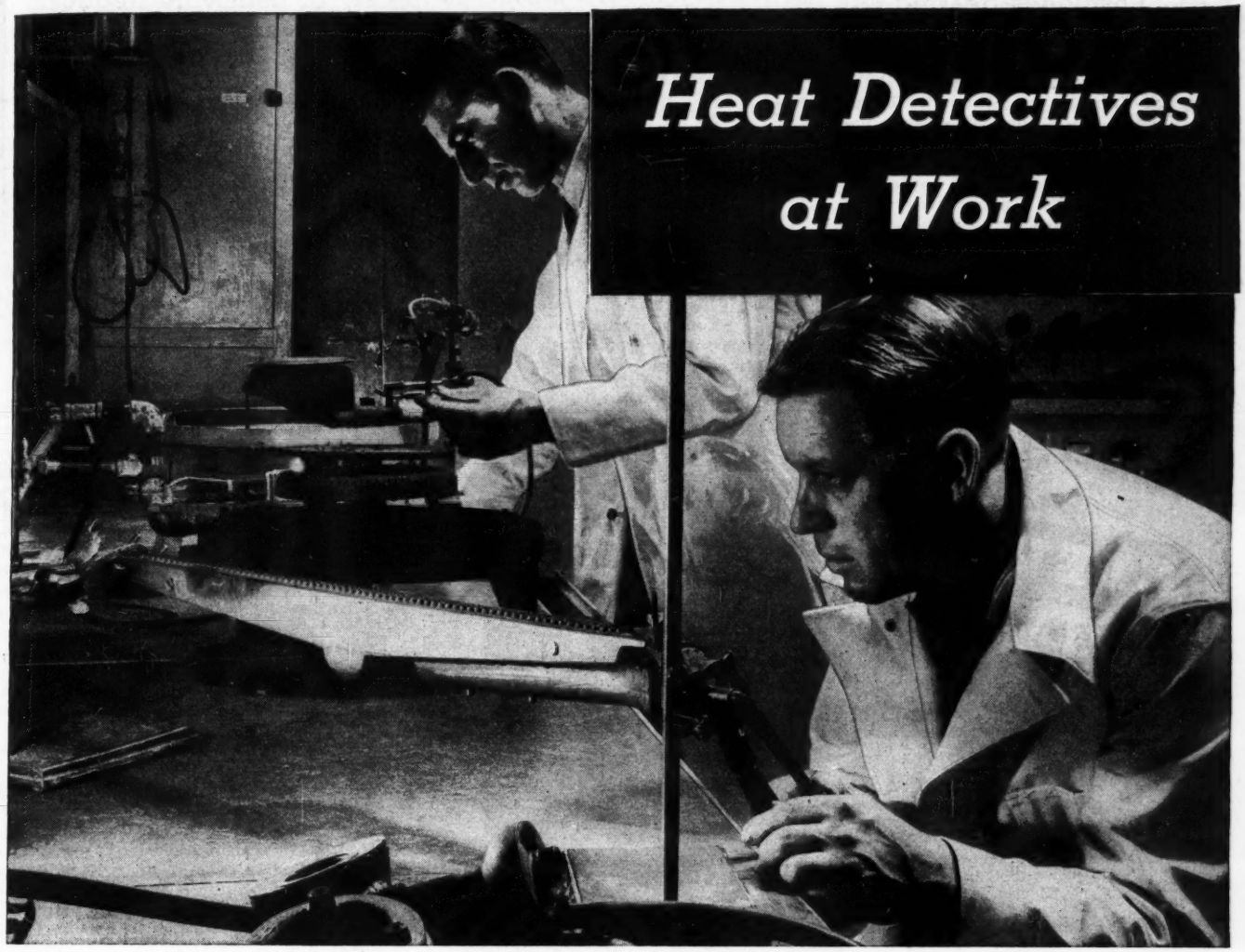
Committee Appointed for 1946 Personnel Conference

M. V. Cousins, personnel director, United Gas Pipe Line Co., and chairman of the American Gas Association Southwest Personnel Conference, has appointed Willard G. Wiegel, personnel director, Lone Star Gas Co.; Grover Jones, secretary, Houston Natural Gas Corp., and Robert G. Kenan, manager personnel department, Southern Natural Gas Co., as a nominating committee to name a chairman and other officers for the Conference for 1946. Wiegel will serve as chairman of the nominating committee which will make recommendations as to the time and location of meetings for next year, as well as the subjects to be discussed.

As soon as hotel reservations can be obtained, members will be informed by Chairman Cousins, as to the time and place of the next meeting of the Conference.

Utility Sets Safety Record

The Superior Water, Light & Power Co., Superior, Wis., was one of four companies in Wisconsin having no accidents for two consecutive years. This was disclosed in announcing the results of the Wisconsin Council of Safety's no-accident contest for 1944 with 120 companies participating.



Heat Detectives at Work

"DETECTIVES" who protect Rheem customers are an integral part of the Rheem organization.

They're the Rheem Laboratory Group . . . technical experts who are forever tracking down trouble before it happens . . . skeptical gents whose combined experience is the keystone of Rheem quality.

Research and quality control for the whole Rheem line, and for all 15 of Rheem's plants, center at the company's modern laboratory in Pasadena, California. Spot checks of every part of every appliance are made by a staff whose creed is—"It's got to be good or it doesn't get by."

Rigid quality control and continuing research on product improvement go hand in hand at the Rheem laboratory. That's why today's Rheem products are better, safer, more economical in service. That's why you can depend on Rheem being ahead of the procession when our war contracts are finished and our new postwar products are announced.

15 Plants Cover Every Major Market

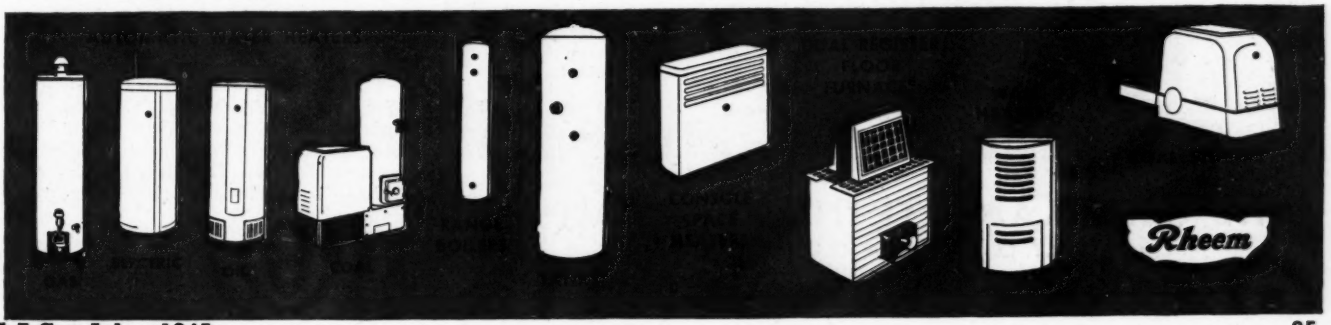
In your plans for the future . . . include Rheem

RHEEM MANUFACTURING COMPANY

Executive and General Sales Offices

New York • San Francisco • Los Angeles

Chicago • Washington, D.C.



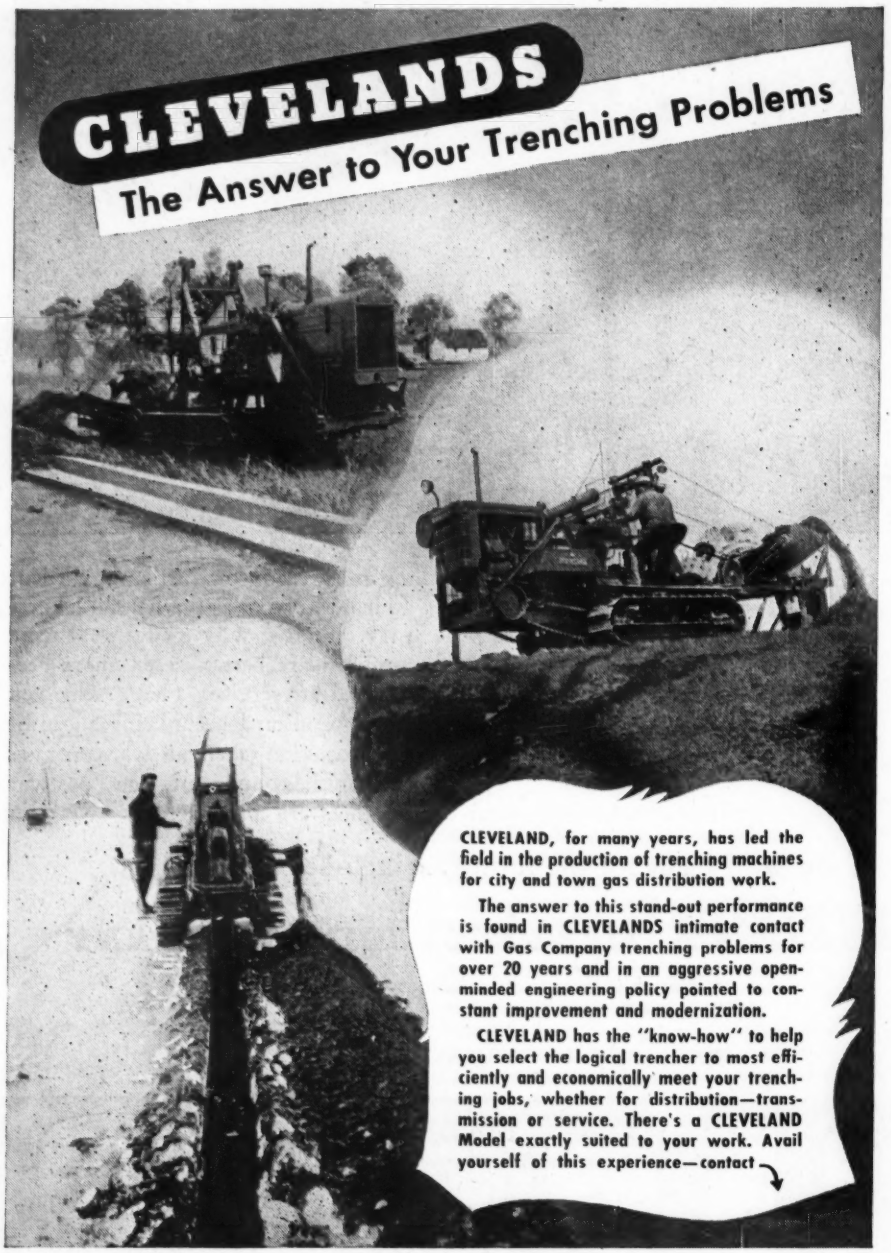
F.P.C. Postpones Hearing On Canadian Export Case

The FPC announced postponement until Sept. 18 of the hearing previously set for June 20 on Panhandle Eastern Pipeline Co.'s application for authority to export 33,000,000 cu. ft. of natural gas daily to Canada.

Under terms of a WPB order of May 29, Panhandle Eastern is not to make any deliveries of gas to Canada until it has delivered nine billion cu. ft. to Ohio Fuel Gas Co. during the period from April 1 to Oct. 31, 1945. The WPB order also stated that no new deliveries of gas are to be made to Canada by Panhandle Eastern during January, February, March and December of any year. This indicated that if FPC grants the authority to export, little, if any, gas could be delivered to Canada until April, 1946, except for a possible period in November of this year.

Pittsburgh Equitable Meter Buys Edward Valve

Pittsburgh Equitable Meter Co. has purchased for more than $1,000,000, and merged with its own company, the Edward Valve & Manufacturing Co., of East Chicago, Ind., which covers 20 acres. Payment was made with less than 50,000 shares of Pittsburgh Equitable Meter stock.


CLEVELANDS
The Answer to Your Trenching Problems
CLEVELAND, for many years, has led the field in the production of trenching machines for city and town gas distribution work.
The answer to this stand-out performance is found in CLEVELANDS intimate contact with Gas Company trenching problems for over 20 years and in an aggressive open-minded engineering policy pointed to constant improvement and modernization.
CLEVELAND has the "know-how" to help you select the logical trencher to most efficiently and economically meet your trenching jobs, whether for distribution—transmission or service. There's a CLEVELAND Model exactly suited to your work. Avail yourself of this experience—contact

THE CLEVELAND TRENCHER COMPANY

20100 ST. CLAIR AVE. • CLEVELAND 17, OHIO

"CLEVELANDS" Save More . . . Because They Do More

City of Louisville Requests FPC Investigation

The FPC has received a petition filed by the City of Louisville, Ky., requesting the Commission to institute an investigation to determine the cost of the production and transportation of natural gas sold by Kentucky, West Virginia Gas Co. of Pittsburgh, Pa., to Louisville Gas and Electric Co. of Kentucky under Section 5(b) of the Natural Gas Act.

According to the petition, the investigation is necessary "in aid of State regulation in Kentucky in order to determine just and reasonable rates for natural gas service in the City of Louisville for the future."

The petition further requests that the Commission consolidate the proposed investigation with the proceedings arising on complaint of the City of Pittsburgh and the investigation instituted by the FPC on its own motion to determine whether any natural gas rates, subject to FPC jurisdiction, of Pittsburgh & West Virginia Gas Co. and Kentucky West Virginia Gas Co. are "unjust, unreasonable, unduly discriminatory or preferential."

Hope Gas Co. Requests Additional Facilities

A hearing was held June 11 by the Federal Power Commission on applications filed by the Hope Natural Gas Co. under Section 7(c) of the Natural Gas Act for authority to construct and operate additional facilities in West Virginia. The proposed projects are:

1. Installation of absorbers, de-ethanizer, still, condensers, heat exchangers and other equipment to increase capacity of the company's existing Hastings gasoline plant in Wetzel County. Estimated cost is $300,000.

2. A 1000-hp gas compressor, with auxiliary equipment, to be located at the Cornwell compressor station in Kanawha county. Estimated cost is $87,958.

3. A natural gas dehydration plant, having a daily capacity of 40,000 Mcf of natural gas, at the Stonewall Jackson compressor station in Kanawha county. Cost is estimated at $35,000.

E. P. Schoch To Advise FPC In Gas Questions

Dr. E. P. Schoch, chemical engineer of the University of Texas, has been invited by the Federal Power Commission to become one of its advisers on natural gas questions. Dr. Schoch has been closely associated with natural gas research and investigations for several years. He is of the belief that the value of natural gas as a chemical component is so great that it should not be used promiscuously for such purposes as boiler fuel.

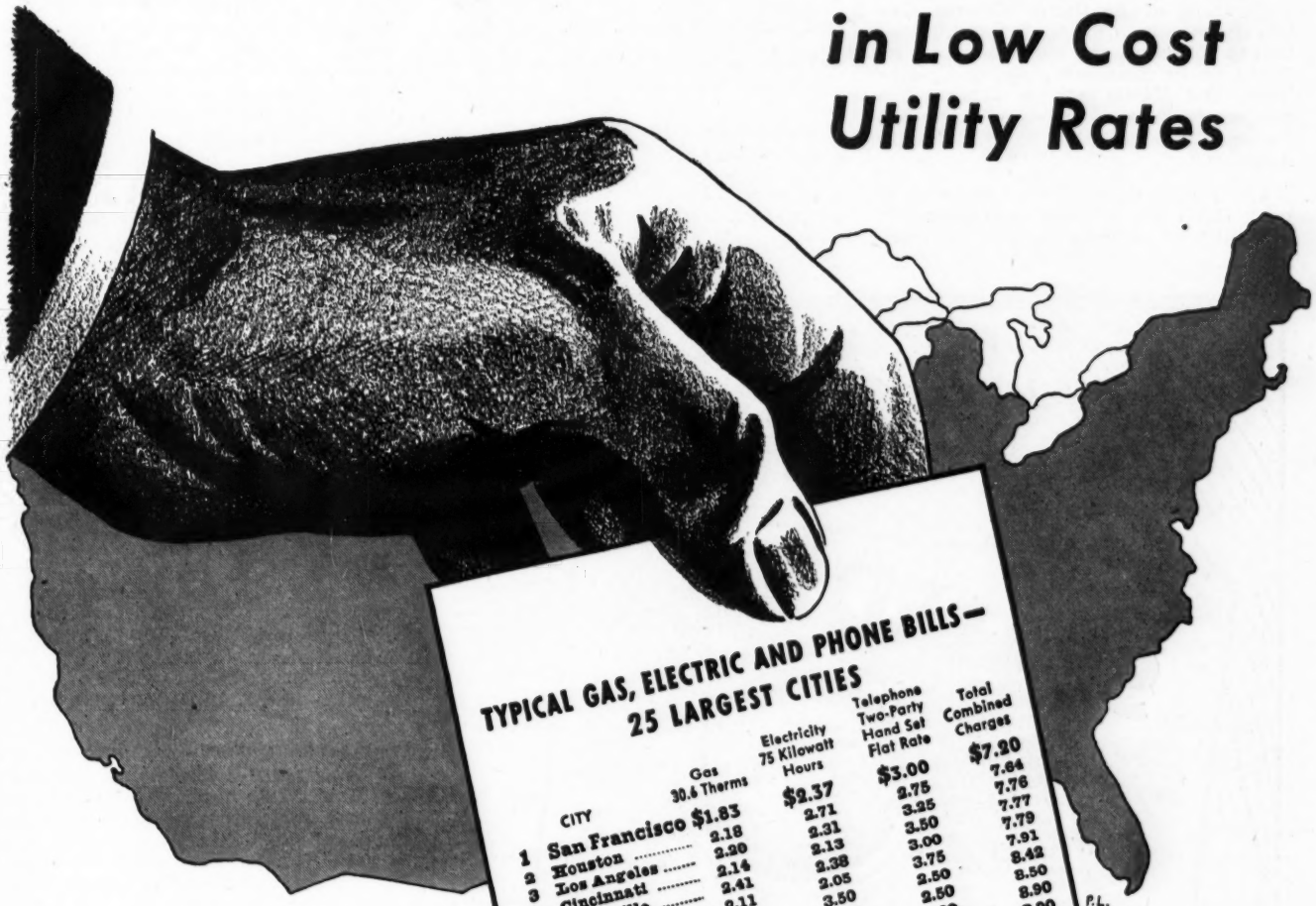
Texas Properties Sold

The producing oil and gas properties of Sam E. Wilson, Jr., Corpus Christi operator, in Nueces, Jim Wells, Aransas, and Sam Patricio counties have been sold to the Houston firm of Boyce Smiser for $3,600,000, the company announced June 2.

The property will be handled by a newly-formed company, the Ceniza Oil and Gas Corp. with offices in Houston.

NATIONAL LEADERSHIP

in Low Cost Utility Rates



TYPICAL GAS, ELECTRIC AND PHONE BILLS—25 LARGEST CITIES

	CITY	Gas 30.6 Therms	Electricity 75 Kilowatt Hours	Telephone Two-Party Hand Set Flat Rate	Total Combined Charges
1	San Francisco	$1.83	$2.37	$3.00	$7.20
2	Houston	2.18	2.71	2.75	7.64
3	Los Angeles	2.20	2.31	3.25	7.76
4	Cincinnati	2.14	2.13	3.50	7.77
5	Louisville	2.41	2.38	3.00	7.79
6	Cleveland	2.11	2.05	3.75	7.91
7	New Orleans	2.42	3.50	2.50	8.42
8	Minneapolis	3.15	2.85	2.50	8.50
9	Pittsburgh	1.65	3.25	4.00	8.90
10	Buffalo	2.21	2.69	4.00	8.90
11	Kansas City	2.99	3.13	3.25	9.37
12	Washington	3.98	2.07	3.50	9.55
13	Detroit	3.83	2.72	3.40	9.95
14	Denver	3.78	3.23	3.00	10.01
15	St. Louis	4.50	2.26	3.75	10.51
16	Chicago	4.25	2.94	3.55	10.74
17	Milwaukee	4.26	2.79	3.75	10.80
18	Indianapolis	4.56	3.23	3.55	11.34
19	Baltimore	4.78	2.95	4.00	11.73
20	Philadelphia	4.83	2.96	4.50	12.29
21	Seattle	6.56	2.38	3.75	12.69
22	Rochester	5.96	3.36	3.85	13.17
23	Newark	6.06	3.60	4.25	13.91
24	Boston	5.84	4.05	4.30	14.19
25	New York	6.55	3.85	4.90	15.30

P.L.

San Francisco Has Lowest Utility Bills Among 25 Largest U. S. Cities

For the third consecutive year, San Francisco is again the Bright Spot of the Nation, with the lowest combined bills for gas, electric and telephone service for average family use. (Comparably low rates apply also to other communities served by this company.)

The table above, taken from the annual report of the California Railroad Commission for the fiscal year ended June 30, 1944, shows:

1. That San Francisco has lowest utility rates among the 25 largest U. S. cities. Average monthly bills here are $1.83 for gas, $2.37 for electricity and $3.00 for telephone—a total of $7.20. Los Angeles, with a tax-exempt municipal electric system is third with a total bill of $7.76.

2. That the monthly average bill for gas and electricity in San Francisco is $4.20. In Los Angeles the charge is $4.51. The one major city in the U. S. with a lower bill is Cleveland with $4.16—a monthly difference of only 4 cents.

☆ ☆ ☆ ☆ ☆

Wartime conditions have brought many increases in the cost of living as well as lowering the quality of service. Your gas and electric costs have gone down and quality of service has been maintained.

P·G·and E·

PACIFIC GAS AND ELECTRIC COMPANY

PIPELINE NEWS

• The Federal Power Commission will hold a public hearing July 19 on the application of **Southern Natural Gas Co.**, Birmingham, Ala., for authorization to construct and operate additional facilities in Louisiana, Georgia, Alabama and Mississippi to increase the company's delivery capacity from the present 220,000,000 cu. ft. per day to 245,000,000.

The proposed facilities, estimated to cost $3,771,760, include approximately 116 miles of pipeline, a 1200 hp. compressor station on the Montgomery-Columbus branch line near Wetumpka, Ala., and other minor facilities .

The company proposes to construct and operate 10 additional lengths of pipeline varying from one to 20.7 miles long, and including 75 miles of 22-in., 17 miles of 20-in., 13.2 miles of 12-in., and 10 miles of 6⅝-in. line.

• There is a possibility that **Northern Ordnance, Inc.**, might lay a 6-in. 44-mile pipeline from the Eden field to San Angelo, Texas, and deliver natural gas at a gate rate of 20c per 1000 cu. ft., if two wells now drilling develop a supply as large as the first two, insuring an ample reserve, and if the entire city was served.

SEALED!
SAFE from Cold, Moisture, Dust and Corrosive Gases.
MACNICK CHART CLOCKS are hermetically sealed, protected against all enemies; uninterrupted service is assured, and repair costs are lowered to almost zero. These clocks fit practically all instruments using circular charts, thus enabling you to reduce your clock inventory to the minimum. Thousands in use by major companies.
MACNICK CHART CLOCK
10 ROTATION SPEEDS! Interchangeable Converter Gears effect one turn of the chart in 2, 3, 4, 6, 8, 12, or 24 hours, or in 2, 3, or 7 days, $3.50 each. 10 accurate rotation speeds with ONE CLOCK!
$9.50 EACH
For the 24-Hour Clock, Complete with Adapter & Winding Key.
SEND FOR BULLETIN NO. 104-A
AMERICAN RECORDING CHART CO.
3113 E. 11th St. Los Angeles 23, California
SEND FOR COMPLETE LIST OF ARCCO CHARTS

• The Federal Power Commission June 1 authorized **Cities Service Gas Co.**, Oklahoma City, Okla., to acquire from its affiliate, **Cities Service Transportation and Chemical Co.**, and to operate the 231-mile Hugoton 26-in. natural gas pipeline. The order states that the company's ownership of the facilities will improve its financial condition resulting in operating economies and simplification of operations.

The acquisition of the facilities, which are now owned by the Transportation company and operated by Cities Service Gas Co. under a 28-year lease as an integral part of its transmission pipeline system, will be effected as follows: Cities Service Gas Co. will (1) purchase from **Empire Gas & Fuel Co.**, its parent, for $3,000,000 cash the Transportation company's outstanding capital stock, consisting of 30,000 shares having a par value of $100 per share (2) liquidate the Transportation company, whose only function is to own the facilities involved, acquire its assets at their recorded cost less depreciation and assume its liabilities, and (3) redeem the Transportation company's debt to Empire in the amount of $7,200,000.

The facilities to be acquired include the 26-in. line extending east from a point near Guymon in the Hugoton gas field in Texas County, Okla., to Cities Service Gas Co.'s Blackwell compressor station in Kay County, Okla., a 15,000 hp. compressor station and dehydration plant at the western terminus of the line, and appurtenances.

• The Federal Power Commission held hearings in Pittsburgh during the week of June 11 on applications of two companies for authority to increase their natural gas facilities.

The Commission heard, on June 12, the request of **New York State Natural Gas Corp.** for the right to install a 500-hp. gas engine and compressor, new gas coolers, circulation pumps and other equipment, costing an estimated total of $51,790, needed to store additional gas to meet peak winter loads.

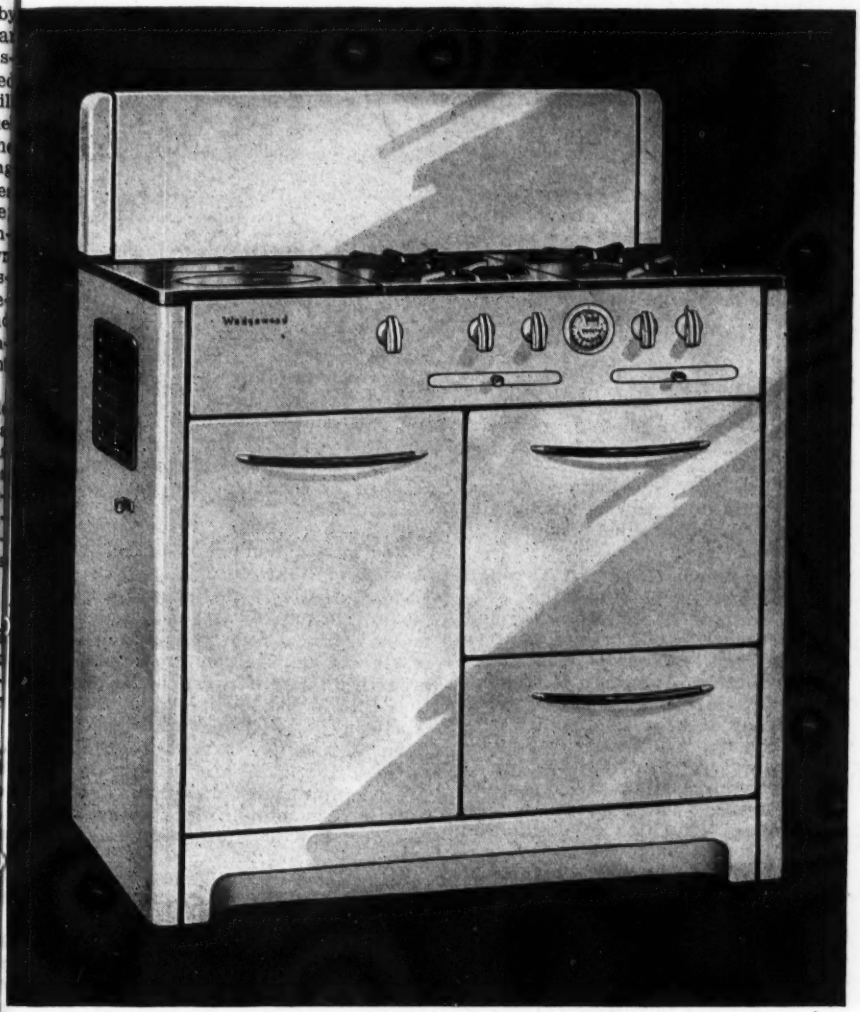
On June 13, the **Manufacturers Light & Heat Co.** presented its application for authority to construct 28 miles of pipeline ranging from 6 to 20 in. in diameter, and three 600-hp. compressors. To accomplish more efficient operation, the company seeks also to make transfers of equipment.

• The FPC has issued a certificate authorizing: (1) **Panhandle Eastern Pipeline Co.** to construct and operate a short pipeline beginning at a point on Panhandle Eastern's "Greenfield Lateral" in Hancock County, Ind., and extending to Fortville, Ind., and (2) **Eastern Indiana Gas Co.** to construct and operate a line extending from Panhandle's line at Fortville to Ingalls, Ind. The order provides that construction of the facilities shall be completed on or before Sept. 30, 1945.

Arkansas Hearing Postponed

The FPC has postponed until Sept. 26, 1945, the hearing previously set for June 25 to determine Arkansas Power & Light Co. accounting adjustments which total $21,174,256.

WEDGEWOOD *has something to* SHOUT ABOUT!...



A NAME THAT STANDS FOR THE FINEST IN

GAS RANGES

with Oven Heat Control

WEDGEWOOD means time-tested QUALITY

● SINCE 1882 the objective of the James Graham Mfg. Co. has been to build the name **Wedgewood** till it stands, as today, for the finest gas range that hard-earned money can buy. Perfect performance, beautiful appearance; lifetime service; these are some of the things **Wedgewood** means. But, above all, **Wedgewood** means QUALITY.

FOR ALL GASES, INCLUDING LP (LIQUEFIED PETROLEUM) GAS

WEDGEWOOD THE MODERN GAS RANGE

JAMES GRAHAM MANUFACTURING CO.

LOS ANGELES ★ SAN FRANCISCO ★ NEWARK, CALIFORNIA ★ PORTLAND, OREGON

CURRENT READING

Control of Semi-Portable Gas Compressors—P. A. Condit. Oil Weekly, April 30, 1945, pp. 40, 42. Modern automatic control equipment is rugged and reliable, and is, therefore, easily maintained and adjusted. Above all, it is easily understood. Experienced and forward-thinking men know that much can be gained by the proper utilization and application of controls in any industry. The secret of proper instrumentation is to delegate the application to engineers who are competent to perform this service. This discussion is concerned with the relatively simple application of instrumentation to semi-portable compressors.

Dehydration of Natural Gas with Diethylene Glycol—G. F. Russell. Petroleum Refiner, April, 1945, pp. 99-102. Natural-gas dehydration is important as an aid toward an uninterrupted flow of gas during the months of greatest demand, as well as a means for more efficient gas transmission and regulation. Though solid sorbents, such as activated alumina are widely used to remove the water vapor from the gas, this paper is confined to the use of a liquid absorbent for purposes of dehydration. Dehumidification is achieved by reducing the concentration of the water vapor present in the natural gas to a value sufficiently low to prevent condensation of water vapor.

Relation of Wall Thickness to Pipe Life—K. H. Logan. "Petroleum Engineer," March, 1945, pp. 186, etc. Improvements in the composition, quality, uniformity and methods of fabrication of both steel and cast iron pipe have resulted in stronger and more dependable pipes, making it possible to use lighter weight pipe with a resultant saving of material and costs. It is of interest to consider the relationship of this development to the life of underground pipe affected by corrosion. The bases of this article are data on corrosion phenomena published by the National Bureau of Standards and supported by those of other investigators, together with certain other data on costs and coating performance, both of which admittedly vary widely from place to place and from time to time. When the principles on which the article is based have been set forth the reader can substitute his own cost and other data and reach conclusions more suited to his local conditions.

The Performance of Gas Lift Through Small Tubing by A. C. Tutschulte, Tide Water Associated Oil Co., Los Angeles. A paper presented at Wartime Conference of the Pacific Coast District Division of Production, American Petroleum Institute, Los Angeles, Mar. 29, 1945. The results of a study of gas lift performance through small macaroni tubing are presented. The individual well behavior characteristics of a number of wells, tested while producing by this method of gas lift, are compared at length. Relationships between factors which affect the performance of this system of artificial lift independent of well characteristics are investigated and developed. A series of charts illustrating these general relationships is included in the hope that they may be of use in the application of this method of gas lift to other wells.

Factors Affecting Measurement of Wet Gas—T. O. Shaw. "Petroleum Refiner," March, 1945, pp. 103-107. There are a number of factors which have a pronounced effect on the problem of wet gas measurement, principally in determining the coefficient to be used. Factors considered most important are: (1) Density of the fluid passing through the orifice; (2) Pulsating flow; (3) Deviation from the true gas law; (4) Correct reading of the charts upon which the pressure and the differential are recorded. The first three of these factors are of extreme importance in determining the proper coefficients to be used in wet-gas measurement, while the fourth is a mechanical problem that has no bearing upon the flow of the fluids, but entirely upon the computation of the results recorded by the meter.

Aerial Surveys for Pipe Line Construction—J. Ammann. Petroleum Engineer, April, 1945, pp. 128, 130, 132.

Calculation of Static Pressure Gradients in Gas Wells—M. J. Rzasa, and D. L. Katz. "Petroleum Technology," March, 1945. 14 pp. The derivations of three methods of computing the static pressure gradients in natural gas wells have been presented to show the assumptions made. Charts were developed from which the pressure gradients may be read when the well-head pressure, the well fluid gravity, depth, and the average well temperature are given. A chart for estimating the well fluid gravity from the condensate content and separator gas gravity is included. The effect of the increased average well temperature after flow on the calculation of the static pressure gradient is discussed.

Determination of Water in Hydrocarbon Gases—H. Levin, K. Uhrig and F. M. Roberts. Ind. and Engr. Chem., Anal. Ed., April, 1945, pp. 212-215. A method is described for determining water in normally gaseous hydrocarbons It is based on the observation that when a gas containing moisture is contacted with cold dehydrated acetone, the water is retained by the acetone, in which it can be determined by reaction with acetyl chloride, titrating the liberated acid. Olefins and diolefins do not interfere and provision is made for correcting for interference by acidic or basic constituents of sample.

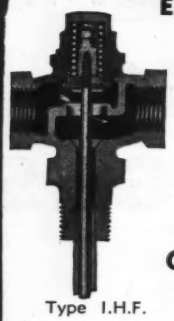
Postwar Chemical Use of Natural Gas—B. Miller. Oil Weekly, April 30, 1945, pp. 50-52, 54. Natural gas is important primarily as a convenient fuel, and only in a relatively minor way as matter to be used or transformed. It is with this minor use of natural gas that this report is concerned, with what one can do with natural gas besides burn it. Some of the products from natural gas that are briefly discussed are: helium, carbon black, hydrogen, aviation gasoline, chlorinated hydrocarbons, and organic compounds.

Mechanics of Producing Oil, Condensate, and Natural Gas—P. J. Jones. "Oil and Gas Journal", March 3, 1945, pp. 53, etc, part 18. March 10, 1945, pp. 71, etc., part 19. March 17, 1945, pp. 107, etc., part 20. March 24, 1945, pp. 71, etc., part 21.
pp. 91, etc., part 22. April 14, pp. 125, 1945, pp. 50-52, 54. Natural gas is im- etc., part 23. April 21, pp. 124, etc., part 24. April 28, pp. 126, etc., part 25.

Predicting Viscosity of Gases at High Pressure—E. W. Comings and B. J. Mayland. "Chem. and Met.", March, 1945, pp. 115, 116. Where reliable data on the viscosity of gases at high pressures are not available, a sufficient degree of accuracy can usually be obtained for design purposes through the use of a new chart developed by the authors. To employ the chart in predicting the viscosity at some elevated pressure it is necessary only to know the critical pressure and temperature of the gas, plus the viscosity at atmospheric pressure.

Modern Compressor Station Design—H. F. Dawe, Petroleum Engineer, April, 1945, pp. 71-78. Installations that will operate with minimum shutdown time and maximum efficiency needed to meet increasing demands for gas.

K-CO
BEST IN BRASS
Since 1897



EMERGENCY GAS SHUT-OFF VALVE for TANK and Automatic GAS WATER HEATERS

Type I.H.F.

PROMPT DELIVERIES
½" and 1" sizes with adequate priority ratings.

KITSON COMPANY
A wholly owned subsidiary of
WELSBACH ENGINEERING AND MANAGEMENT CORPORATION
1500 WALNUT ST., PHILA. 2, PA.

WELSBACH

EXPERIENCED WATER GAS OPERATOR WANTED
Established Gas Utility Operating Carburated Water Gas and Liquefied Gas plants need Gas Maker who would advance to assistant supt.
Give age, experience and reference. Write to Box 720, GAS, 1709 W. 8th St., Los Angeles 14, California.

COMFORT-PLUS WITH THE NEW PANELRAY

Day & Night's new **PANELRAY** brings the latest development in radiant heating to the gas industry.

This completely vented gas wall heater radiates infra-red energy throughout the "comfort zone" of a room, from floor to standing height. Traveling with the speed of light, the infra-red waves give instant warmth that's fresh and clean.

PANELRAY is easily installed entirely above floor level. No cutting of floor or rugs. Shipped packaged ready to install, **PANELRAY** fits between standard 4" wall studs in any room, upstairs or down, in old or new buildings. Available in single units of 10,000, 20,000 or 30,000 BTU and in dual units of 20,000, 30,000 or 40,000 BTU. All models can be equipped with automatic thermostatic controls.

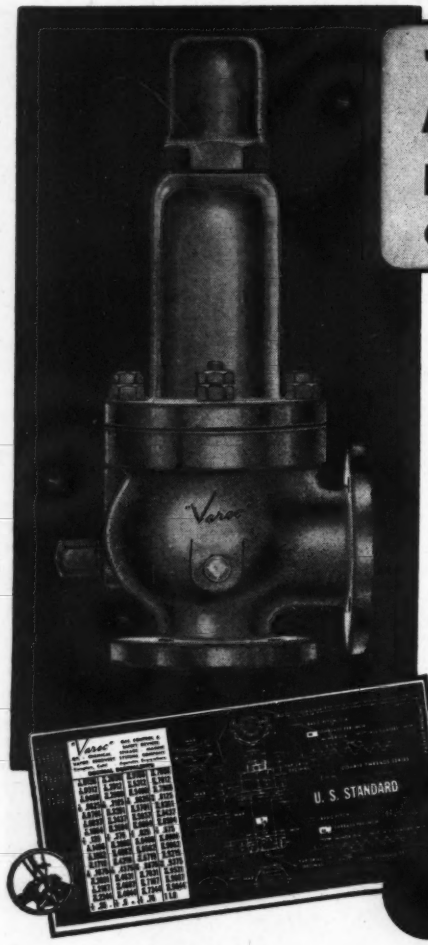
Another strong selling point of **PANELRAY** is the patented "Heat Trap" flue designed to baffle the upward sweep of heat while the burnt gases are allowed to escape.

WRITE FOR FULL COLOR BOOKLET TELLING COMPLETE STORY

DAY & NIGHT MANUFACTURING CO.

MONROVIA CALIFORNIA

One of the Dresser Industries



"VAREC" approved ANGLE RELIEF VALVES HAVE *Greater* CAPACITIES

"VAREC" top-guided Valve Plug design insures greater "free-flow" capacities. Rugged durability of "VAREC" approved Angle Relief Valves assures greater efficiency and performance in Water, Oil, Air, Steam, or Gas Service. They are designed especially for handling temperatures and pressures encountered in Chemical, Gas, and Petroleum operations where positive, dependable action is demanded. These Valves are the pressure-tight, regrinding type, equipped with "VAREC" patented Hyperbolic Inner Valves insuring minimum "blow-down." They feature a high lifting force against valve plug, an unrestricted flow, and an accurate spring action. Various sizes, combinations of sizes, materials, and pressures guarantee "tailor made" performances demanded by engineers' specifications.

Free WITH COMPLIMENTS OF "VAREC"

Use "VAREC" Slide to obtain U.S. Standard dimensions for coarse and fine thread series, U.S. Standard (and other commercial sizes) Woodruff Keys, and American Standard Pipe Threads, plus decimal equivalents, millimeters into inches, and other pertinent engineering data.

The Pace Setter Since 1928

THE VAPOR RECOVERY SYSTEMS COMPANY
Manufacturers of Gas Control and Tank Equipment
COMPTON, CALIFORNIA
New York City New Orleans, La. Houston, Texas
Tulsa, Okla. Agencies Everywhere

GAS METER INDEXES AND FITTINGS

Many Standard Meter Parts Carried in Stock

We will be pleased to submit quotations to your specifications and blueprints.

THE E. F. GRIFFITHS CO.

346 E. Walnut Lane **Philadelphia 44, Penna.**

SEMET-SOLVAY ENGINEERING CORPORATION

Blue Gas Plants
Water Gas Machines
Washer Coolers
Naphthalene Scrubbers
Gas Purifiers
Condensers
Waste Heat Boilers
Producer Gas Plants

40 RECTOR STREET, NEW YORK, N. Y.

NEW PRODUCTION

• Denial of the permit to pipe natural gas to the Lower Rio Grande Valley of Texas to industrial consumers in Monterrey, Mexico, will lead to intensive development of the gas fields across the Rio Grande from producing fields in Hidalgo and Starr Counties, McAllen oil men predict. The No. 1 Mission well of Petroleos Mexicanos, across the Rio Grande from the Penitas field has already proved the existance of heavy producing gas sands in Northern Mexico. This would place production within about 100 miles of Monterrey, and subsequent exploration may show the field extends much closer to that big industrial city.

• **The La Grange** gas pool was extended one-half mile to the east by **Hanley & Bird** in Lorain County, Ohio. A thickening sand was logged at 2363-82 ft. and gauged at 3,465,999 cu. ft.

In the same area the **Ohio Fuel Gas Co.** extended the upper Wellington pool over into Pittsfield Township. Ohio Fuel encountered gas in the Ohio shale while drilling a Clinton wildcat in Morgan County ,Ohio. First gas at 1917 ft. increased to 3,320,000 cu. ft. at 1932 ft. The well will be turned into the line for a few days before completing.

• **The Ohio Oil Co.** completed a good Oriskany gas well on the Richard Deny farm, Columbiana County, O. The new field so far proven extends about two miles. Possibilities of a stratigraphic trap of considerable size are indicated, and tests are drilling as far as six miles northeast of Mahoning County.

• **Tagagrt Bros. Co.** of Big Rapids, Mich., have scheduled extensive new development of the natural gas prospects in Osceola County, Mich. The firm obtained from the state conservation department four of the 19 drilling permits issued during the week of June 3.

N. Y. Market Survey Released By Consolidated Edison

Consolidated Edison Co. of New York, Inc., released on June 20 its comprehensive study of economic life and the living and buying habits of New Yorkers. Entitled "Survey of the New York City Market," the book contains 1924 pages and has 63 charts, 83 tables, and 87 maps.

The market survey was prepared by Consolidated Edison to help every business with a product to sell or a service to render in New York City. It is for the use of department stores and those dealers merchandising gas and electric appliances, as well as retail stores, chain stores, banks, manufatcurers, utilities, etc. It can be used as a foundation for market analysis to determine the location and degree of buying power, outline sales territories, set sales quotas, check sales efforts, allocate advertising expenditures, and to locate stores or other types of business.

Standardized mechanical joint for use with cast iron pipe in sizes 3 to 12 in.

Standard Joint Developed By Cast Iron Pipe Assn.

The members of the Cast Iron Pipe Research Association have now made available a standardized mechanical joint with complete interchangeability of parts for use with pipe and fittings in size from 3 to 12 in.

Glands, gaskets and bolts and nuts bought from any member of the Cast Iron Pipe Research Asosciation can now be used with the pipe bought from any other member. There will no longer be any necessity of keeping several types of accessories in stock for each size of pipe, and the annoyance and delay that has occurred in the past due to the wrong parts getting on to a construction job will no longer occur, according to a release from the Association.

Fittings, ordinarily used for gas construction, are also equipped with the standardized joint. Fittings will be all bell and will have the same laying length as standard flanged fittings. Pipe in sizes above 12 in. equipped with the mechanical joints of the individual members is available as formerly.

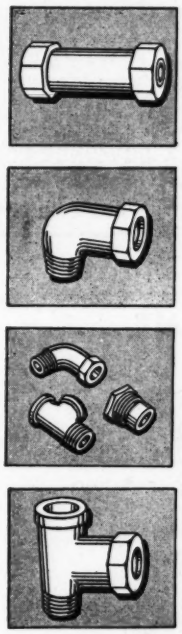
Prior to the standardization program, there were available a number of joints, all tested and approved by the American Gas Association Labortories as suitable for gas distribution purposes.

"Victory Home of Century" Features Gas Appliances

Featured in the Steel Pier, Atlantic City, "Home of the Century," to be visited by more than 500,000 people from June 15th through September, will be a completely automatic gas range built to "CP" specifications. The "Victory Home of the Century," now being exhibited for the eighth consecutive year, has been designed by William F. B. Koelle, designer of the Steel Pier, to show visitors what they can expect to find in houses built to sell for approximately $8500. Included in this model home will be a gas refrigerator, an automatic gas water heater, and an automatic gas furnace.

NORMAC COUPLINGS SLEEVES AND FITTINGS

for maximum deflection, ease of "stabbing," complete confinement of the rubber!



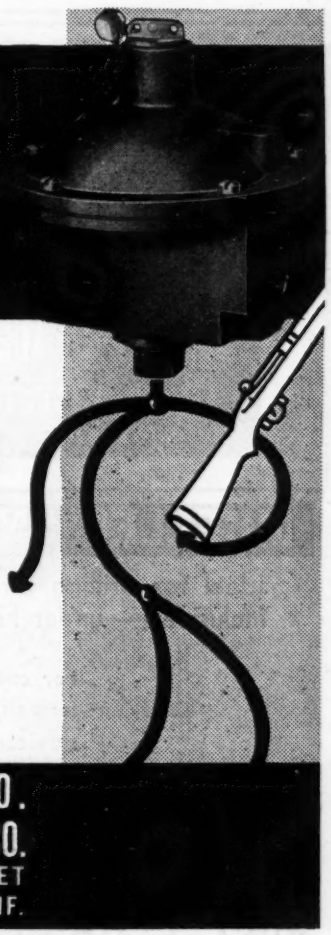
So close are "Normac" rubbers confined at the gasket tip that possibility of flow is reduced almost to "nil." These couplings, sleeves and fittings . . . approved by gas utility men across the country for their time-saving features, ease of handling and dependable service . . . are available in a complete range of sizes. Made from air furnace malleable iron they provide greater wall thickness than pipe on which used.

NORTON-McMURRAY
MANUFACTURING COMPANY
39 South La Salle St. Chicago, Ill.

SEND FOR COMPLETE CATALOG

Couplings - Meter Bars - Sleeves - Cocks - Bell Joint Clamps - Service Tees & Ells

STANDING GUARD FOR *Economy*

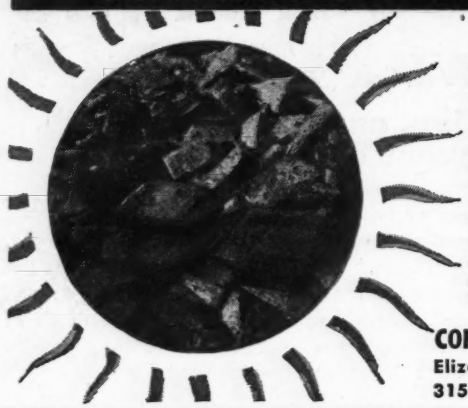


Precision engineered for sturdiness, long life, and trouble-free service, the H-M Low Pressure Regulator saves labor and money. Regulating and controlling your gas flow through the use of H-M Regulators you can solve your pressure problem.

Send for complete details regarding available sizes and specifications.

HM REGULATOR CO.
THERMO CONTROL CO.
800 EAST 108TH STREET
LOS ANGELES 2, CALIF.

CONNELLY IRON SPONGE



High in efficiency . . . low in cost. In hundreds of plants throughout the country, Connelly Iron Sponge has proven itself . . . the finest purification material on the market. Not only does it lower your purifying cost but its high activity and capacity tends to reduce distribution and service complaints because of the cleaner gas which ultimately lowers operating and maintenance costs.

If you have a problem in gas purification, Connelly's 68 years of experience is at your service. Our engineers can help you . . there is no obligation on your part.

CONNELLY IRON SPONGE & GOVERNOR CO.
Elizabeth, N. J. Los Angeles, Calif.
3154 S. California Ave., Chicago 8, Illinois

IT'S LIKE *writing* A LETTER HOME

These ads month after month . . . telling you that all of our production is going to war . . . are simply to remind you that the name to remember when you want real snap-acting gas controls after the war is

SPENCER THERMOSTAT CO. KLIXON ATTLEBORO, MASS.

The Mettler "FAN-AIR" Gas Burner

IS A MECH'L DRAFT AUTOMATIC gas burning SYSTEM embodying electric and throttling control with "TRANSAXIL" FLAME GUARD PILOT all properly combined for safe, efficient combustion. It's the "post war" burner. Available now and prompt shipment of all sizes.

IDEAL FOR SCOTCH MARINE BOILERS

Mettler Entrained Combustion Gas Burners
FOR ALL Purposes Kinds of gas Pressures
BUILT UNDER PATENTS: JANUARY 25th, 1916 JANUARY 2nd, 1923 MAY 26th, 1925 NOV. 4th, 1926
LEE B. METTLER CO.
406 S. Main St. Los Angeles, Cal.

MUELLER "N" DRILLING MACHINE

Ideal for drilling through gate valves — sizes 2" to 4" inclusive — under high pressure.

For cutting in laterals, large services, etc.

Light Weight Ruggedly Built Write Dept G-81

MUELLER CO. Decatur, Ill.

Remington Rand Releases Data on Seniority Records

In order to assist personnel directors in preparing necessary records to handle the problems of seniority which are becoming acute, the Systems Division of Remington Rand, Inc., Buffalo, N. Y., has compiled Management Controller No. 709 which is devoted to case histories of the records used by many large and small corporations.

The return of veterans and reconversion activities, requiring temporary layoffs or cutbacks of the labor force confront Personnel Executives with the need for exact knowledge of seniority in order to deal justly with all employees, as well as to meet the needs of management and the provisions of labor union contracts. This booklet covers a wide variety of records and applications and is illustrated by specimen forms and arrangements. The material contained should be helpful to companies which have not as yet created adequate seniority records.

Copies of Management Controller No. 709 may be borrowed from any office of Remington Rand, Inc., or obtained on a loan basis from the Systems and Methods Research Department, Systems Division, Remington Rand, Inc., 465 Washington St., Buffalo 5, N. Y.

Tennessee Co. Authorized To Build New Facilities

As a war emergency measure to supply additional gas to the Appalachian area during the coming winter, the FPC has authorized the Tennessee Gas and Transmission Co., Houston, Texas, to operate under lease from Defense Plant Corporation, four new compressor stations totaling 33,600 hp. to be built by DPC, in Washington County, Miss.; Hardeman County, Tenn.; Robertson County, Tenn; and Montgomery County, Ky. The Commission also authorized the company to construct and operate additional cooling equipment, scrubbers and compressors at five existing stations.

Committee Named To Study Texas Gas Reserves

Lieut. Gov. John Lee Smith last month named a committee of five Senate members authorized in a resolution, by T. C. Chadick of Quitman, to investigate natural gas resources of Texas. Each of the five members has gas or oil producing fields in the district which he represents. The committee under the provisions of the resolution is authorized to make a thorough investigation of the state's potential gas supply, the amount of withdrawals, the purpose of withdrawals and the purpose for which it is being used.

American Central Opens New York Offices

New York offices of the American Central Manufacturing Corp., Connersville, Ind., were opened May 15 on the seventh floor of 101 Park Avenue. A permanent display of the several types of steel kitchen sinks, wall cabinets and base cabinets manufactured by the company are on view, both as individual units and as kitchen ensembles. As new postwar items become available, they will be added to the display.